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BOTANY IN ELEMENTARY SCHOOLS.

THE use of plants in elementary instruction has become so well established as to need no defense. The problem is not whether plants shall be studied, but what is the most effective method of using them. There are certain general principles that seem to be clear, and may be stated; but their application demands a certain amount of experience on the part of the teacher and great amount of detail. The principles that should control any handling of plants in elementary instruction may be stated as follows:

1. There should be no organization of a science of botany, with a logical beginning and development. Such presentation of a science belongs to more advanced instruction. This means that no logical order is to be followed, so far as the subject of botany is concerned, but that selection is to be made from the wealth of material present in every region. It is not continuity of subject, but continuity of stimulus to the child, that is needed at this stage of development. Whatever is available and whatever meets the requirements of the instruction is to be selected, whether it fits into any definite scheme or not.

2. A wise selection from the vast amount of material is best made by the experienced teacher; but a general principle of selection should be that the material must be related to the experience of the pupils. For example, in the case of inland schools a choice between the use of a seaweed and of a tree growing in the immediate vicinity should not be hard to make.

3. The purpose in using this material should be to keep functional the tentacles of inquiry which are a possession of the

normal child. This proposition is in view of the fact that the conventional education has largely resulted in rendering these tentacles functionless, and in later years the pupil comes to science study, not merely with a loss of power, but with a loss of desire for scientific work. It is a notorious fact that the college students who are attracted by work in science represent a small percentage of those who are receiving education, and yet almost every child has been born with scientific inclinations. The great amount of work that must be done in elementary education probably precludes the cultivation of the scientific impulse during elementary training; but the thing I have in mind is at least to keep this impulse alive, so that it may be ready to lay hold of scientific material when the opportunity comes.

4. In the use of this material two things should be kept in mind: (*a*) there should be no dead work, that is, work which when done has no significance; (*b*) emphasis should be laid constantly upon function rather than upon structure. For example, in studying leaves the prominent idea is to discover, not the multitudinous forms and vein-systems of leaves, but what leaves are doing for a plant. The conception must be developed that plants are alive and at work, rather than dead things which have parts that must be named. It is easy to assign numerous topics that treat of plants from the standpoint of function, but it is the interest of the pupils that must determine the topics that are most serviceable. The exercises must hold the interested attention of the pupil, or the very purpose of the work will be defeated. I have seen a vast amount of what has been styled dead work in connection with the use of plants in elementary training. For example, the endless treating of leaves of different forms and the working out of venation of different types represent work that has no special significance when it is done. Many of the exercises seem to be devised by the teacher to employ the time assigned to carry out a requirement without any special knowledge of its significance. The statement that the interest of the pupil must be used as a test of the success of the work should be taken with due allowance.

There are some pupils who may never be interested in work of this sort, but the teacher recognizes whether general interest has been secured. There is often danger of pressing a particular problem too far, and interest is evaporated by monotonous repetition. It is the first contact that interests the young, and a judicious passing from one subject to another will keep interest from passing into disgust.

5. In my judgment the instruction in every case should be oral, and there are two prominent reasons for this proposition. In the first place, it is one of the few opportunities which come in school experience to break the bondage of the book. There is an overwhelming chance that pupils will confuse subjects with books and have no conception that the subject is something quite apart from the book that may treat of it. Besides, the fallibility of books cannot be too early emphasized. Over and over again has it been my experience that pupils who have come to the university from schools regard the statements of a book as ultimate authority rather than the testimony of their own senses. There is no better subject for teaching the real place of a book than nature-study. A second reason why instruction should be oral is that only in this way can there be the most perfect adaptation of instruction and material to pupils. Unless a book is written for a definite locality, it can never be a real guide to the best use of plant material in elementary instruction. When a teacher uses a book, the tendency is almost inevitable to follow it in its details as well as in its general suggestions. This makes the material and the order of its presentation perplexing.

6. It cannot be too strongly urged upon teachers that many of the books written to help in nature-study contain what are called "fairy-tales" by scientific men. These fairy-tales take the form either of fanciful personifications or of flights of fancy that are always wild and misleading. For example, an excellent recent book contains the following statement; "If the sky is overcast, the tree is drowsy; if rain sets in, it goes right off to sleep." To a child the meaning is entirely clear, but at the same time is entirely false. Such touches are intended to attract and

hold attention, but when the result is a misconception the attempt cannot be too strongly condemned. The claim is made that the facts of science are interesting enough to hold attention even when studied sanely. One of the peculiar advantages of the study, as contrasted with most of the other subjects handled, is that it is one subject that may be used to keep one's feet on the ground. If the plain facts of science are to be the occasion for flights of fancy, there is nothing left to enable the pupil later to distinguish between what is sane and what is wild. I fancy a large amount of what we call the gullibility of men and women who have passed through the schools arises from the fact that they have never been compelled to distinguish absolutely between fact and fancy. Nature-study in elementary instruction is exactly adapted to do this service, and hence should not be compelled to aid in the further development of an unanchored imagination.

7. It would seem wise, in order to prevent a somewhat chaotic and repetitious presentation of material, to arrange for five or six prominent problems each year, the problems differing each year, increasing in difficulty of interpretation, and together building up a real body of fundamental knowledge. In addition to these prominent problems, minor observations indefinite in number and character should be sifted in. Each problem should be of a character to involve at least four things: (*a*) individual observation or experiment; (*b*) written or sketched description; (*c*) independent conclusions; (*d*) oral instruction, with perhaps assigned readings. The individual work is necessary, not only to secure the definite contact of the subject with the mind of each pupil, but also to develop personal responsibility. It is well also to develop unprejudiced observation by giving no special information as to what will be seen. The majority of pupils are so docile that they see what they are told to see, and there is no independent observation. I have seen many cases in which younger pupils are better observers than the older ones, and I know no other reason than that the latter have been trained to become more and more dependent.

One of the most fundamentally important things is to bring

together the individual results and compare them. Probably the most common error to be observed among intelligent people is generalization from a single observation. If the whole work of a class be brought together and compared, differences will be developed. These differences in observation must be settled by repeating the observation or experiment. There will thus be developed the knowledge of what is common to all the results and therefore essential. And there will also be developed a certain amount of variation. In this way a habit of caution is developed, and some idea as to what adequate proof involves. It should also be remarked that only very definite work should be assigned to young pupils; work that has already been traversed by the teacher, and whose results are assured. It is not only confusing and discouraging, but it is even disastrous, to work at random. Every observation or experiment should involve a very definite result plainly in sight.

The proper results of such training may be stated as follows: (1) a sustained interest in natural objects and phenomena of nature; (2) an independence in observation and conclusion; (3) some conception as to what an exact statement is; (4) some conception as to what constitutes proof. In short, the result should be an independent, rational individual, the kind that society needs more than anything else.

It may be well to give a concrete illustration of the kind of material that would seem to meet the conditions described. Perhaps no plant form thrusts itself more conspicuously upon the attention of pupils than trees, and acquaintance with the prominent trees of a neighborhood would seem to be one of the duties that the teacher owes to pupils in work of this kind. The first thing to be done is to select some typical forms, not taking up trees as they happen to come, but selecting here and there those known to be really representative of the different kinds. Perhaps one of the first things to do is to sketch the general plan of the tree before it is in foliage, a plan that cannot be obtained so easily when obscured by leaves. Simply to ask that a sketch be made would not be sufficient, for some pupils will go into that endless detail that only wastes time, and others are likely to go

to the other extreme. The general plan must include certain definite things, such as the relative extent of the main axis, the location and direction of the main limbs, no attention being paid to the indefinitely multiplied spray. It ought not to be a conventional tree, simply a straight axis with branches, but as nearly an exact pattern of the tree-plan as can be put down upon paper. It will be a matter of surprise to most pupils to draw a conventional tree and then compare it later with the actual tree when completed. It is good to accompany this study of trees without foliage by some practice in recognizing common trees from general habit. Unless a tree has been warped or distorted, it is surprising how quickly pupils recognize the general pattern.

In this same connection study might be made of the bark, noting its thickness, the way in which its surface breaks up, and the method of shedding. The recognition of trees by the bark is also a useful exercise.

Then comes the study of the tree putting out its foliage, and the following questions are at once suggested: Which trees show leaves first? Which get into full foliage first? Which is the slowest in getting into foliage? How long after the leaves first appear is the tree in full leaf? All of these questions involve the element of time in connection with the operations of nature, an observation which very few people make. I presume it would be exceedingly difficult even for adults who have lived among trees all their lives to answer these questions. After the trees are in full foliage a study of the leaves of different types of trees may be made, so that trees can be recognized by their leaves as they have been already by their habit and their bark.

This work will result in a mass of observations, which later should be put together and the common trees of the neighborhood described as to their habit, their bark, their leaves, and whatever other characters have been developed in the course of the study. Too many trees should not be introduced early. One form should define itself clearly before another is added.

This is but an illustration of a very elementary handling of the subject of trees, which could pass later on to the study of

the fiber of wood, the length of a year's growth, the rings of growth, etc.

A random list of topics that are important and at the same time within easy reach of observation by very young pupils is as follows: autumn coloration, the fall of leaves, the ascent of sap, underground habits, soils, shedding rain, transportation of seeds in dirt, the effects of drought, the relation of light to the green color and the growth of parts, the positions of leaves in reference to light.

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SOME STEPS IN THE EVOLUTION OF SOCIAL OCCUPATIONS.

III.

As long as man was unaided by artificial devices, he was greatly limited in the use of the food materials which were at hand and which later came under his control. Impelled by hunger, he naturally availed himself of those materials which most quickly attracted his attention and which yielded him sufficient nourishment with the least expenditure of labor.

In the choice of foods man was guided by his instincts, by his senses, and by his experiences. Man's sense of taste at that time was a far safer guide than it is at present, since it had not become habituated to the use of artificial flavors. Taste was one of nature's methods of indicating whether a food was beneficial or injurious to the organism. But it was not due so much to taste as to the use of associative memory that man was able to inaugurate a campaign upon his natural environment which has been carried on from that day to this. Associative memory enabled him to take account, not merely of his own personal experiences, but of those of his neighbors. It enabled him, likewise, to take the suggestions afforded by the natural world.

Man's instincts and experiences united in causing him to leave all but the lower forms of animal life undisturbed. He was unable to cope with the larger animals. The fear which they aroused in him was due to an organic strain called forth by an instinctive response to a dangerous situation. For a long time man avoided conflict with the wild beasts and helped himself to their products and stores in an unobtrusive way.

Previous to the conquest of fire, it was the vegetable world, rather than the animal, that supplied man with the larger part of his food supplies. Only gradually was he able to increase the sources of his subsistence beyond the most conspicuous plants, which, fortunately, were also the most useful ones. Succulent

stems and leaves, fruits, berries, buds, blossoms, thin-shelled nuts, and even the tender bark of trees — all these were made use of by man in his most feeble state. Shoots of the wild asparagus, stalks of celery, tender twigs of oak trees, leaves of the cabbage, the watercress, and lettuce were easily appropriated and furnished man with valuable nutrients. Wild peas and beans were gathered from the hillsides where they grew, and were eaten in the green pod just as children in country districts eat green peas today. Spots that furnished wild berries, apples, pears, and plums were resorted to at the proper season, though they were often eaten when green, or even in the bud. The custom of eating green fruit was not due to scarcity alone. It was a habit formed to meet the demand of the organism for potassium salts, which are more abundant in green fruits than in ripe ones. All these natural foods were eaten on the spot where they were found, except when a sign of danger prompted man to bear such as he could seize quickly and carry to a safe place of retreat. Since the hands were not yet free from the function of locomotion, it was necessary for man to make use of his teeth, his toes, or his arm pressed against his side in carrying objects. A sufficient motive to call forth the invention of the basket or of a device for attaching the burden to the body was not present until after the conquest of fire.

But man cannot live on vegetable foods alone. Such foods do not contain a sufficient amount of salt (*sodium chloride*) to satisfy the demands of his organism. Until man learned to find salt in its pure state he was obliged to satisfy his instinctive craving for it by seeking for foods in which it is found. Animal foods, pre-eminently, are those that are rich in salt. Accordingly, from the earliest times man availed himself of such animal foods as he was able to appropriate. For a long time these consisted chiefly of such forms as the larvæ of beetles, the pupæ of ants, butterflies, caterpillars, spiders, snakes, lizards, young birds, squirrels, rabbits, turtles, frogs, and, in short, of any form which he was able to overpower.

Man not only availed himself of the flesh of animals, but he helped himself to their products and stores of food. The eggs

of birds, the honey of bees, nuts stored away by the squirrel and woodpecker, the bone buried by the wolf—all contributed from time to time toward satisfying the pangs of hunger. For many reasons honey was a very acceptable food at this time. Its flavor offered an agreeable contrast to the prevailing bitter taste of a majority of the wild plant-foods. The active life that characterized the period made a demand for a large amount of heat and muscular energy, which, owing to the scarcity of available fats, was supplied in part by the use of honey. The ease with which it was digested operated with other causes in making it much sought after by the river-drift man. Of manufactured sugars there were none at this time. Aside from honey man found natural sweets first, when he was an infant, in his mother's milk. Later he found them in the fully ripened fruits and berries, in the stems and roots of grasses, in the beet, the turnip, the rutabaga, and the carrot. The absence of the sugar maple and the sugar cane from Western Europe during the mid-Pleistocene period did not permit man to utilize their sap in supplying his craving for sweets. Plants rich in starch, to be sure, supplied man with sugar, but the burden of manufacturing the starch into sugar was placed upon the digestive system.

The seeds as well as the fleshy portions of the pumpkin, the squash, vegetable marrow, the muskmelon, the watermelon, the cucumber, and other varieties of gourds were undoubtedly eaten, their hard shells furnishing the first drinking-vessels of man. Water was the chief beverage of the river-drift man, though it was probably supplemented by the warm blood of such animals as he was able to capture. Fresh water was found in springs, in lakes, in running brooks and rivers. Man drank at first by direct contact of the lips with the natural supply or by using the hollow of his hand for a dipper. But gradually the shells of gourds, horns, or other natural forms were used as drinking-cups. Since man at this time had no means of carrying water, he never went far from a natural source of supply. In his wanderings he was no doubt guided by the presence of animals that habitually resort to a natural drinking-place each day.

It is probable that man as well as the animals instinctively

sought plants possessing medicinal or stimulating properties, and that, as he found in them the means of increasing his strength and courage, he resorted at frequent intervals to the spots where they grew. The mild stimulus thus received undoubtedly was of value as a means of accelerating human progress.

Probably man first learned to enlarge the sources of his subsistence through the observation of the habits of the grass-eating animals. The succulent bulbs and roots firmly imbedded in the soil were less conspicuous and more difficult to procure than berries, fruits, and succulent stems and leaves. But they constituted an important element in the food of the wild hogs, and by observing these creatures as they rooted up and devoured the turnip, the rutabaga, and the wild carrot, man was stimulated to take the suggestion they offered. At first, no doubt, he pulled these roots up by their tops or dug them up with his fingers. But the difficulty encountered in procuring the larger roots unaided by artificial devices of any kind was sufficient to stimulate man to devise an easier way, and the digging-stick thus appeared. For a long time it consisted of the most available natural form that could be found upon the spot, for the *use of natural forms* always precedes the *manufacture* of tools or implements of any kind. A branch with a sharp point, a long bone, a horn, or any other natural object that could supplement the use of the hands and enable man to apply his energy more advantageously than before, constituted the digging-stick—the most primitive form of a large class of implements which are now used in cultivating the soil. Although the wild parsnip was present, it was not suited to human consumption, for in the wild state it contains a poisonous principle, which the river-drift man had not learned to remove. All the wild roots were more pungent and disagreeable to the taste than the cultivated forms with which we are familiar; but man was so occupied with the problem of procuring a sufficient amount of nourishment that he had no time to devote to ways of rendering foods more palatable.

Among the several varieties of edible fungi, the mushroom was the most easily obtained. Not until the habits of the wild hogs were observed did man discover where the truffles grew;

for there was nothing upon the ground to indicate their presence. But by watching the wild hogs as they rooted under the oak trees, man learned where to look for them; and, remembering this fact, he was able to procure them when the wild hogs left the spot.

The acorns, which furnished a valuable food for the wild hogs, were too bitter and too difficult to digest to recommend themselves for human food, except in cases of extreme necessity. Later, when man learned to remove the bitter flavor and to grind them into a flour that was more easily digested, they formed an important food material; but the bitter varieties native to western Europe were not well adapted to the use of the river-drift man. It was different, however, in the case of the hazelnuts, beechnuts, and walnuts. Though their kernels were imprisoned in hard shells, man early learned to crack them with his teeth. The difficulty presented in the case of the large nuts with thick shells stimulated man to devise artificial ways of cracking them. The use of the smooth stone as a hammer undoubtedly arose in the first instance from the need of cracking hard nuts. The use of the hammer-stone not merely served to extend the number of foods upon which man might draw, but it lightened the burden placed upon the teeth in cracking hard shells, and, in so far as it was used in crushing the harder varieties of food, it lightened the mechanical part of digestion. It is not probable, however, that any but the faintest beginnings were made in the process of crushing food during this period.

No mechanical invention of the period was more significant with reference to the enlargement of the sources of subsistence than that of the stone hunting-knife. Very likely natural forms of wood,bone, or horn had been used as knives before; but the pebble, chipped at one end so as to have a sharp point, is a distinct advance in man's method of life. It represents a greater control of environment than had appeared before. It bears witness to the fact that man was no longer content with the mere use of natural forms, and that he began in that early age the work of modifying such forms to suit his purposes. Whether the hunting-knife was suggested by the use of natural forms, by the breaking

of the hammer-stone, or by some other process, is not recorded. Very likely all these processes contributed to its invention. By its use man greatly increased his power in procuring nourishing food of various kinds. Armed with this crude weapon, man was better able to hunt the small animals than he had been before. He could use it in removing the skins of animals and in hacking off strips of raw flesh, as well as in reducing to more convenient form many of the larger plant foods which he used. The crude hunting-knife, the hammer-stone, and the digging-stick constitute the important mechanical inventions of this period. They served to enlarge the sources of subsistence, to lighten the burden placed upon the body in procuring foods, and they offered a suggestion, at least, of ways of lightening the work of digestion.

But the invention most significant for this period, if not for all time, was the conquest of fire. By offering man protection from the wild beasts, it allowed him to save energy which previously had been expended in escaping from wild beasts. The energy thus saved would have enabled man to live as well as he had before with much less effort. But the opportunity to advance was made use of, and the surplus energy was expended in ways fundamental with reference to future times.

The common life that developed with the use of fire involved a co-operation and a division of labor impossible before. All felt the need of preserving the fire; and since no one had yet learned how to make it, the women who had young children stayed near and kept it burning, searching for such wild foods as they could find near by, while the men, and the women not burdened with young children, exploited more distant regions. For a long time people followed their old habits, each searching for his own food; but the common life around the fireside at night, where the personal adventures of the day were recounted or acted out by means of gesture and pantomine, suggested other modes of co-operation. The hunting-dance, which was developed during leisure hours, was an expression of the store of surplus energy made possible by the advantages resulting from the use of fire. That this energy should be discharged along lines marked out by the prac-

tical activities of everyday life was inevitable. That its expression should be modified so as to lend itself to the accomplishment of purposes hitherto beyond the possibility of achievement was one of the many instances that reveal the method by which the race has advanced from the humblest beginnings to its present state.

It may have been the use of the firebrand as a means of protection in the search for food that suggested its use in hunting the small animals that burrow in the ground. At any rate, man early learned to chase these small creatures to their burrows and to smoke them out by the use of fire, whereupon he quickly dispatched them by means of a club. The fact that an animal sometimes escaped served to make man more conscious of the need of assistance; and, gradually, two or more persons united in hunting small animals in this way. But it was the larger animals that aroused the strongest motive for co-operative action. They were a constant source of terror. Little was accomplished during this period, however, in the warfare waged upon them; and since this warfare constitutes a characteristic feature of the next two epochs, this phase of the subject will be treated in connection with the occupations of those periods.

The use of fire as a means of cooking was probably not noticed during the period of the river-drift man. It is probable, however, that foods were cooked accidentally at this time; but man's attention, being so fully occupied with problems more vital to the age, was not attracted so as to perceive the significance of such accidental phenomena.

The processes of production and consumption during this period were not separated by an interval of time. The activities involved consisted of a great variety of human movements. The motive power in all cases was furnished by the human body whose physical co-ordinations set the pattern for the mechanical inventions of all times. The phase of the process that may be termed "production" consisted of the exploitation of environment in search of those plants and animals upon which man could lay tribute. The manufacturing art consisted, first, in the direct use of the organs of the body in reducing food materials to a form

suited to the action of the digestive tracts, which at this time performed many of the mechanical and chemical processes now relegated to machinery and the action of heat, as well as the labor involved in disposing of a large amount of refuse matter; second, in the selection and use of natural forms by means of which to supplement the efficiency of the organs of the body; third, in a slight modification of natural forms for the sake of still further increasing their efficiency; and, fourth, in the conquest and use of fire, by means of which man greatly increased his power to secure nourishing food, and which he later learned to apply to other processes as well. The beginnings of distribution were involved in the habit of resorting to the spots where desirable food materials were found, for it was not until a much later date that foods were carried to a place removed from the spot where they were procured. Although man made no conscious effort to preserve foods at this time, he made use of the foods preserved and stored by nature's processes. The processes of consumption were largely automatic. There was no dressing of materials, no cooking, no serving, no companionship in sharing food. The digestive system was so taxed by the burden since handed over to the manufacturing processes that it was unable to derive all the nutrients from the foods consumed. In so far as there was a conscious rejection of the most conspicuous refuse, there was a beginning made in sifting and cleaning food. In so far as there was a conscious selection of ripe fruits and vegetables in preference to green and half-grown products, there was an instinctive recognition of the value of the natural cooking which was effected by the sun's rays.

The mechanical appliances of the period were implicit in man himself and were used chiefly in an automatic way. Only as they were perceived to be inadequate did they become the subject of conscious attention. Then man sought in various ways to supplement his weakness and to apply his power in the most advantageous way. The digging-stick, the hammer, and the hunting-knife thus appeared as means of reinforcing the work of the nails and the teeth. These tools were used for a variety of

purposes, for the special interests which called forth specialized tools were a product of a much more advanced stage of culture.

The period as a whole is characterized, not by *making*, but by *finding* and *using* what is at hand. Many of the processes which have since become conscious and been relegated to complicated machinery, during this period, were performed within man's body in an unconscious way. From one point of view the evolution of social occupations is an account of the way in which the processes which formerly took place within the body in an unconscious way have been handed over to machinery.

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HOW AND WHY WE LEARN.

III

THIS discussion of the different views of the process of learning is not a discussion of different ways of learning. There is but one, which I have called "nutrition," believing that the figure involved in the use of this term most nearly describes the act; that when anything is learned, it has become a part of the mind in a sense quite similar to that in which food digested and assimilated has become a part of the body. While the figure is not exact, it is nearly so, for not only does the act of learning produce a modified and enlarged mind, but the thing known is modified. In so far as we can see, no fact, even the simplest, is exactly the same as known by two minds.

Different terms are used in different educational philosophies to represent practically this idea. Such a term is "apperception," brought into use from the philosophy of Herbart, which indicates the vital relation between the knowing mind and the thing known, or rather between the things known before and the new truth as it is learned. This does not go as far as the theory of nutriment, for it seems to recognize too marked a distinction between the knowing mind and the things known, as if that which had been previously learned were lying in the mind and to it new facts attached themselves when learned. It does not sufficiently recognize the modification of the mind itself through growth.

The term "assimilation," commonly applied in the older educational philosophies in part to the act of learning, is better and goes farther than the term "apperception" of the Herbartian philosophy. Indeed, the term itself implies an act preceding, but almost identical with, nutrition. Along with it, however, in these older philosophies, are used other terms implying that facts may be learned without assimilation, though not so well learned; making assimilation merely a higher degree of learning.

My contention is that there is no learning at all except that which may be figuratively described as "assimilation" and "nutrition;" that, unless a truth becomes thus a constituent of the mind, it is not learned at all. So my argument is not for a particular kind of learning, known as nutrition, contrasted with other kinds of learning based upon the physical as distinguished from the biological analogy. It is rather that, there being but one kind of learning, all work in school should be directed to securing that; that all effort directed to anything else is wasted or worse; and, as I stated in a previous article, that many of our schools have endeavored to treat knowledge as the possession of some specific, tangible thing by the mind, useful, indeed, but not essential to the mind.

So we have had the "common intelligence school" and the "formal discipline school," both resulting in enormous waste from misdirected energy, though both have resulted in much good in spite of the theories of the schoolmasters, because the mind has assimilated some of the facts presented and has received nutriment from them.

Education through the receiving of nutrition is a law of life, and all life is a great educational process, continuous and unending. Thus education results from reaction against environment. By environment I mean, not merely that which surrounds us, but that which we feel as an influence and against which there is a psychic reaction. Our environment, or the portion of the surrounding world which we thus feel, nourishes, enriches, and strengthens the mind, and only that against which there is a psychic reaction affects us at all.

School life should be an epitome of life, more fruitful and tending more rapidly to growth than the ordinary life, because it is directed, and the things which affect the mind are carefully selected and differentiated from other things so as to reduce the waste to the minimum. Too often the school life has not been so fruitful as the larger life. It has furnished less of proper environment, the direction has been wrong, and it has been filled with forces and material which the minds of the children could not receive or be affected by directly, so that a

vast amount of the energy of the teacher has been thrown away because what he presented has not been nourishing to the minds of children. In the true school, that is presented to the children for learning which may be learned; that is, which may enter into the mind as a constituent and may nourish it.

In the old courses, represented in the two classes of schools already spoken of, the chief consideration was the subject-matter to be taught. Certain facts which were supposed to be useful were selected and logically developed with slight regard to the conditions and needs of the young minds set to learn them.

The first consideration of the good school, or what might be called the "nutrition" school, is not subject-matter, but the mind itself, and not mind in the abstract or in general, but minds, as found in the individual children. For, as no two minds are alike, so can no two minds be profitably given exactly the same treatment for educative purposes. The subject-matter to be taught is important, but of secondary consideration; it must be selected because of its fitness for the child rather than because it may be logically developed or is useful in life.

The mind and the subject-matter must be studied together to find their relations, and for each child the result will be somewhat different from that in any other child; and, as the minds to be nourished by learning are young and immature, and as young, immature minds grow very unevenly, the differences will be greater than among mature minds, and the very greatest care is necessary in the selection of material in order that there may be as little waste as possible.

This theory reduces the possible generalizations upon education and compels us to take account of the individual children. Indeed, it substitutes children for "the child." This is a hard doctrine. It disturbs the equanimity of the calm philosopher who sits in his study, reads the philosophy of history, and *ex cathedra* puts forth a general curriculum for schools based upon his philosophical knowledge of the world.

It also disturbs the child-study generalizer who, adopting the scientific method, gathers a mass of facts about children and then generalizes for the mass on the theory of averages.

It compels these at frequent intervals to "go way back and sit down," while the individual teacher studies each child and endeavors to give him the food he needs. This doctrine compels us to admit that the need of each child must, to a very considerable degree, determine both the subject-matter and the method of his education. It asserts that interest, appetite, is one of the indications of need. Of course, it does not deny that there may be bad appetites which may not be indulged; that the child may not have an appetite for what he has never tasted; and hence new appetites may be induced by the presentation of new foods. But this is a mere caution. It denies that all food is fit for children. It recognizes that the child is not a little adult, but is a very unevenly developed organism, whose proper nutriment can only partially be determined by any generalizations or systems of averages regarding that which is outside of him.

The mind truly nourished by knowledge is not inflated like a balloon, it is not expanded into a sphere, it is not even symmetrically developed; it grows into its environment near and remote, it develops power for use in the world it must live in.

As learning represents the reaction of the mind against its environment, it follows that in order to make complete the learning there must be furnished abundance of opportunity for that form of mental activity which we call expression; for nutrition is the result, not merely of successful feeding, but of exercise as well. For genuine nutrition, free movement, employing the strength which nutriment furnishes in as many ways as possible, is necessary.

The child cannot learn truly by merely sitting and conning books. A necessary accompaniment to this reception of fact must be the putting into effect the thing learned; that is, the children must express what they are learning in order that the act of learning may be complete, and they must express it in as many ways as possible, in ways most natural; this is the method of the larger world. The man who does things and makes things understands the things better than the one who simply observes. So that school must represent the larger life, not

merely in furnishing a rich environment, nutritious and strengthening, but also in furnishing abundance of inducements for activity.

There have been some recent utterances indicating a belief that the best way for children to learn is in isolation; that, if children were shut up away from the world in a thesaurus of facts about life, they would absorb them and at the end would come forth enriched and ready to do something. This would seem hardly worth notice except for the exalted source whence it comes.

Shutting in a child from his environing world in a world of books, and keeping him isolated, that at some time he may be given back to the world enriched with the knowledge of the past and the remote, has a large and philosophical sound, but is really sheer nonsense. It suggests the dutiful son who runs away in boyhood and after forty years comes back with a fortune, pays off the mortgage on the old farm, and gives his aged parents a fine funeral.

It is the fashion to trace our philosophical notions back to the Greek philosophers. I can think of none upon whom the responsibility for this notion can be placed except the *scholastikos* who advised his son to learn to swim before going into the water. Knowledge is still too often regarded as the acquisition to be put into safe-deposit vaults against a rainy day.

No one holds in greater reverence than I the treasures preserved in literature and the other monuments of men's labors. But the value of all this is manifest only when it makes man more efficient in the present. It is well, it is noble, for men in cloistered retreats to seek out and preserve truths unknown before, because, even though they may little enrich the discoverers, they enrich the world and will enable others to serve their day. Such search is the exalted mode of serving, chosen by the few. It constitutes their life, but this is not education for the many.

In school the study interprets life and life interprets it. The riches of all ages and all worlds, in so far as they are disclosed to the eye-minded, merely nourish through knowledge

the student's mind, and hence they give a wider and fuller and deeper insight into the world in which he must live and work, and make higher service possible.

Cloistered isolation suggests two worlds, a double life: that of the immediate present, the pressing environment; and that of the remote in time and space, the world-wide, the world-old. Such a double life, if possible, would defeat its own ends. It would fill the world with learned incompetents.

The popular demand for practical education rests on a firm foundation of philosophy and psychology. It is, like an instinct, not to be ignored. The popular error is not in the demand, but in a misunderstanding of what is really practical, narrowing it to a few manifest values, as the commercial.

But the people are often wiser than the philosophers. Knowledge acquired in education should be closely and constantly related to life. It should expand life. The double life is absurd. At no time should the content of knowledge given to the young for educative purposes be narrow. It should be as broad as interest and should continually broaden interest. Nourishment includes vastly more than the mere acquisition of food, it involves such exercise as shall change the food into brawn. This exercise may not be merely the effort necessary to acquisition. The body will not thrive through exercising the digestive organs alone; it will be fat and flabby like the swine which, while fattening, is not allowed to roam at will for exercise. The exercise must be of the organs in which we desire to produce strength. This is the argument against extreme isolation in school life, and for allying the school as closely with the abounding life of the world as possible.

The athlete is isolated only from what is harmful, not from activities. He is not shut up in the dining-room. School is life to prepare for life. Knowledge is always the basis—wide, varied, multitudinous knowledge; but as acquired it must be employed.

The test of a theory regarding education and of the sincerity with which it is held is found in the kind of school produced. There are instances enough of the truly educative school to

serve as criteria. In this school the children are the first consideration, not merely theoretically and sentimentally, but truly and thoughtfully. Their needs are the basis of all the instruction, and these are determined by the careful study, first of the children themselves, second of the world around them in which they must live, and they are studied together, with the aim that each child may grow into social efficiency, which is the end of education.

Thoroughness is not in this school a fetich; only so much of a branch of knowledge is given at a time as can be digested and assimilated. To expect a little child to know thoroughly any subject is as absurd as to expect him to consume all the bread in the house before eating any meat. Yet his knowledge is not a smattering. What he knows is thorough in one sense because it is vital. He knows thoroughly what he knows, for it is a part of him, after the biological analogy.

The elementary school in which the teachers sincerely and intelligently believe that the educative function of knowledge is to nourish the mind is the school in which children live a life of joyful activity. They go to their work with an eagerness comparable only to that with which they begin any of the natural activities of body or mind.

There is always a motive inherent in the work; it supplies a felt need. The activities employed in the process of education are no more unnatural than those essential to physical growth. The mind is surely as natural as the body, and, when healthy and normal, requires no more a violation of nature for its growth than does the body. But the work of the school is the work of children, and not of adults cut to a smaller pattern. There are activities suitable to children, and they all have an obvious purpose acceptable to the childish mind. Tasks dictated for an end obvious to the teacher alone, although that end may be the future welfare of the children, do not appeal to them. They certainly do not cultivate that most necessary of powers, the power to labor, to drudge even, for a high, though remote, end; for this power comes only from an appreciation of the worth of this remote end, not from blind obedience to another's will.

It is this appreciation of the worth of the end that supplies the inspiration necessary to carry us through long years of dreary drudgery toward a sought goal, and this end is evident in the true school, resting, according to the biological analogy, upon a belief in the living, growing mind requiring nourishment. It is lacking in all schools founded upon any other basis.

In this school the children acquire intelligence, for the air is charged with it. They not only know the common symbols of the eye-minded; they can apply them in a thousand ways not dreamed of in the "practical" school. They can read and write and cipher, for they continually use these arts to express the thoughts suggested by the countless things learned in their school life, and their intelligence is real, not verbal.

The children in this school receive discipline, for they work as they never do in the other schools. They work with a will, because they work with a motive. They get the kind of discipline that the man gets who toils night and day to perfect an invention for the advancement of civilization. The motive is inherent in the work itself, and consistent with it. It is not foreign and artificial, like a mark or a prize. This is the only true discipline. This develops self-direction, self-sacrifice, the subordination of ease, and all lower pleasure to the higher joy of work for achievement. It cultivates moral power, inner law, in place of the hypocritical yielding to external force too often bred in the so-called disciplinary school.

This school also furnishes the higher intelligence, the broad culture, of the third class, but vastly richer and more real. The content of the curriculum in the nutritive school is as broad as civilization, as extensive as the world, and it is approached in such a way as to make the knowledge real.

In no school is knowledge so highly valued — genuine, first-hand knowledge. The whole broadening of the curriculum, which is the most noticeable phenomenon of our modern school, is due to the spread of the belief that the mind is to be nourished by knowledge. Literature, history, science, music, art, sociology, manual training, domestic science, have come into the

school through this door. True, many have accepted them, not comprehending their educational value; but that does not affect the major fact.

In this true school children are made acquainted with their material, social, and spiritual environment as in no other, not primarily because there is such an environment, a knowledge of which is useful, but because this knowledge furnishes the best nutriment to a mind growing into organized society — a society whose subordination of its material environment to spiritual ends constitutes its chief claim to superiority.

This school is the school of expression. The children engage in numberless activities employing all the powers of their minds. They express in varied ways what they receive. Thus they make it their own, incorporate it into the very constitution of their minds. The knowledge is not stored up against a day of comprehension; but by the exercise attendant upon the various means of expression it grows into the fiber of their beings, and makes them strong and adaptable, as the athlete by exercise makes his food a part of himself.

In this school is freedom and joy and hard work and discipline and abundance of knowledge, because the center is a child, a growing child, needing nourishment rich and varied; and every activity engaged in, and the knowledge imparted, are prepared to meet his needs. Thus and thus only is a child best fitted for social efficiency; and social efficiency is the end of education.

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THE RELATION OF THE KINDERGARTEN TO THE PRIMARY SCHOOL.

THE point of view of a person is broad, liberal, narrow, or prejudiced, according to the extent of his experience and the attitude of his mind toward new ideas. Perhaps it is well for humanity that conservatism is such an inherent quality of our nature; but it is equally fortunate that an occasional individual should be endowed with the spirit that dares all things that he may promulgate the new truth, or new aspect of an old truth, which he has discovered. The world has need of the conservatism of the many, on the one hand; of the enthusiasm of the individual, on the other.

New ideas, new methods of work, especially where their adoption would affect the community at large, need to be challenged that they may be seen in all the extent of their relation to past, present, and future before such adoption takes place. As we trace through history the great changes in thought, or empire, we realize how slowly the more radical and lasting of them have gained their hold upon mankind. For nearly two thousand years the humanity of the gospels has been conquering brutality, overcoming hatred and malice with brotherly love; nor is the work yet complete. So when we find in the educational world that new ideas, new methods of work, meet with rebuff, that teachers cling to the old and are suspicious of the new, it is only the old story; and it is wise, or helpless childhood might suffer more from experiments than from the clinging to old methods of doing things.

From some quarters the cry is heard that there is too much experimenting in educational work at the present time; that the children are suffering from it. While this may be true to a very small extent in isolated instances, the visitor in almost any primary school of our great country would be impressed with the prevalence of the *old* rather than the *new* in the essentials of the primary-school work. This is treading upon slippery

ground, but so many *mistake the addition of a little busy work for new methods in primary teaching.*

That the primary teacher even today should be a little suspicious of the kindergartner and her methods, should still be inclined to look upon kindergarten work as pure play tending toward riotous disorder, is not surprising. Too often the kindergartner, with the best motives in the world, rebelling against the restraint to child mind and body found in the primary-school room, but utterly ignorant of the actual conditions and problems which confront the primary teacher, has given voice to general principles, or specific rules, which the poor primary teacher, with a definite outline of work assigned for completion within a limited period, has found utterly impracticable of application. So it has come to pass that in some places a spirit of hostility has been engendered between kindergartner and teacher; in others mere tolerance of each other's work exists; while in still others that harmony of work which is believed to be possible is being sought.

Before a harmonious blending can be secured it is necessary to understand the nature of the separate parts which are to constitute the whole. If there is to be continuity in education from the kindergarten to the university, the nature of the work at its various stages, the relation of each to what precedes and to what follows, must be fully known.

For what does the kindergarten stand? "*Development through self-activity.*" A much-abused phrase, but nevertheless one which expresses in the fewest possible words the basis of the kindergarten system of education. To Frederick Froebel does not belong the honor of having discovered the principle involved. It had been seething in the minds of educators for generations. Rousseau and Pestalozzi labored hard to base their work upon it, but the former was led astray by the impracticable; the latter, like many of his successors, was hampered by the requirements of tradition. To Froebel belongs unquestionably the honor of flinging tradition to the winds and successfully placing such material in the hands of teacher and child as makes possible this "development through self-activity."

What is this material? How does it make possible the desired result? To his knowledge of books, nature, and educational principles Froebel added a study of childhood in its untrammeled moments, of motherhood in its unconscious efforts to assist the babe in growth of body and mind, and, after years of thought and experiment, prepared two sets of materials technically known as *gifts* and *occupations*, these to be supplemented by *games*. They form today, as originally, the curriculum of the kindergarten.

However fanciful some may think the derivation of Froebel's *gift* material to be, it nevertheless affords the child an opportunity of acquiring elementary ideas in number (quantitative as well as numerical), geometry, and physics, in the most natural, unconscious way, at the same time that hand, eye, and ear are being trained to accuracy, and the inventive imagination stimulated and given scope for action, for outer expression in tangible material. Should other material better adapted to put the child into possession of these elementary ideas, while developing his powers through use, be presented, it will be cordially welcomed by kindergartners.

The *occupations* present to the child the simple stages of the world's great industries and arts. Rightly used, they open up large opportunities for acquiring useful knowledge, a wholesome love for work, sympathy with the world's workers, as well as technical skill, ingenuity, self-reliance.

Then come the *games*, with their opportunities for social and spiritual development; their cultivation of a community spirit, of self-restraint, of brotherly love, and helpfulness. Time and space allow only the briefest statement of the most characteristic features of each of these occupations which constitute the trilogy of the kindergarten.

The great principle which underlies this system of education, which is the test of all its results, is its ability to arouse and develop through self-activity all the child's latent powers. Many a kindergartner, failing to grasp this truth, fails in securing to her little charges the full benefit which might accrue to them. Imitation and direction, which are necessary, indeed indispen-

sable, are too often allowed to become the most prominent part of the kindergartner's work with the children, thus preventing individual or original expression of thought on the children's part; while, on the other hand, some kindergartners are so lax in the presentation of material that for want of proper direction as to its possibilities both time and material are wasted, while untidy, shiftless habits are inculcated.

Freedom, not license, direction which tends to awaken and stimulate the child's self-direction, should be the kindergartner's steadfast aim. Children thus trained will have gained a store of ideas plus a stimulus to fresh acquisitions; some power of expressing thought in material and language; a tendency to observe with accuracy, to infer cause from effect; will have acquired a certain skill of eye and hand, a certain power of attention, some measure of ingenuity, of self-direction, of self-reliance. Quite naturally this means a healthful activity on the part of the children.

Having now some idea of what kindergarten education means, we are ready to consider primary education. Of what does it consist? How does it differ today from that of a generation or so ago? What further changes must it undergo to meet successfully the conditions of today? And, lastly, is it possible to harmonize kindergarten and primary work?

In answer to the first question, "Of what does primary education consist?" the world at large would undoubtedly agree that it consists in the mastery of the "three R's." If we enter a primary class almost anywhere in our land today and remain throughout a session, the impression gained will be that the educational world likewise agrees to the truth of the old saying; nor do educational writings convey any other impression as a rule. I know not whether anyone has as yet asserted that *reading, writing, and arithmetic are not the chief work of the primary school.* Yet there are signs that such a conviction will be reached and acted upon before many years have passed.

It is not necessary to go back more than three generations to reach a time when life was simpler, when children came more directly into contact with nature and with the industries in their simpler forms. Though school life was something entirely sepa-

rate and foreign to the other experiences of their life; though it chiefly called into play memory at the expense of more important mental powers, yet the home life and environment offered so many opportunities for the healthy, natural growth of these other powers of mind and body that children did not suffer so seriously from the narrowing process of routine school work. It was hateful, it was drudgery to them. When conquered, it was looked back upon with complacency, even gratitude, as one of the elements which had helped "make the man." But when *it* conquered, many, many have been the men and women who have thought with a sigh of what "might have been."

But today the conditions of life are wholly unlike those of our grandfathers' time. The environment into which the vast majority of children enter at birth offers but little help to the healthful, natural unfolding of childhood's latent powers. The crowding into those great centers of civilization, the cities, the centralization and specialization of the great industries, the contact with only finished products, deprive children of familiarity with the raw materials, with the processes of their manufacture—formerly for the most part by hand—and the inspiration to imitate or aid their elders thus afforded; they lose, too, that healthful sense of manly power, of self-respect, which springs from the conquest of nature, from the ability to turn the raw products into articles serviceable to mankind; they miss that counter-check to overweening self-importance which a realization of the limit to man's power furnishes through this more direct contact with nature.

It is only the children of the very poorest who are brought into contact with the great industries of today—and then in a way that tends to cramp and dwarf all their powers, to make them mere machines skilful in one little direction, utterly helpless and useless in any other position of life.

In the home life conditions are also changed. The many little duties which the boys in the vast majority of families were expected to perform as their rightful share in easing the burden of family toil, and which afforded the best opportunities, under natural conditions, for the growing powers of the boy to expand,

no longer exist. Modern conveniences in the home economy have freed the boys from all participation in that mutual helpfulness which aids so to strengthen the ties of family love and duty. Where their help is necessary to increase the family income, even where not employed in a factory, industrial conditions are such that it is impossible for the boy to avoid contact with that spirit of competition which so warps mind and soul, so lowers life's ideals, when it enters into the young life. The girls have not yet been so fully released from their share in home duties. Let us hope they may not be, at least until something equally as potent in teaching unselfish efforts in others' behalf be found.

With these changes in environment, which shut out so much of the old that was helpful in the all-around development of children, new conditions, new responsibilities, confronted the teacher. The old routine of school work, which gave no thought to a symmetrical development of all the powers of body, mind, and soul, but sought chiefly through constant drill to secure well-stored minds, was now seen to be totally inadequate. The school must in some way supply, and in more ideal form, conditions which had formerly existed in home and environment, but are now lacking.

It was to meet this strongly-felt need that manual training was introduced into the high school, at the same time that, for this and other reasons, the kindergarten was gradually commending itself to public favor and patronage. But between the kindergarten age and that deemed suitable for manual training lay the years, from six to twelve or fourteen, when the vast majority of children must complete their school work ; years, too, when mind and soul are in their most plastic stage. Must these years, the only available ones for school training for such large numbers of children, be given over to the old routine work ? Must one-half of them be devoted to acquiring a mastery of the mere tools of knowledge ?

Slowly but surely the influence from above and below, from manual training and kindergarten, has been filtering through these intervening years and causing changes for the better, but

there remains much to be done yet, especially in the primary department. The present transitional state of the work bears with far greater strenuousness upon the primary teacher than upon the children. For, while retaining all the old work, she must add to it all the newer elements, often taxing time and ingenuity to the utmost to bring about the desired results.

It is undeniably true that the greater part of the school time from the first through the fourth year is given over to acquiring a degree of fluency in reading, greater or less according to the standard required, to gaining a legible handwriting, some power of expressing thought in writing, and some ability to use figures. I use the word "figures" advisedly, for the "science of number" seems to be something entirely different from the use of figures as ordinarily taught in the primary school. A little six-year-old girl of my acquaintance, who could read numbers into the hundreds as we rode down Broadway in New York city, was given five peanuts one day. She was observed to arrange them in order, count them, then eat the one she had counted last. Asked how many she had left, she replied, "Four." "How many did you eat?" Answer, "Five." "Why!" was the astonished response, "how many did you have at first?" "Five," said the child. "Then, how many have you eaten?" "Five," persisted the child. The numerals stood in that child's mind, as in many another child's, for names, not quantities. Very seldom are children so taught number as to understand the unit value of our notation, of fractions, and of decimals. Some years of experience with hundreds of high-school graduates demonstrated the haziness of the simplest mathematical principles in the average mind. Permit a single illustration: $\frac{1}{4}$ of 8 and $8 \div 4$ are regarded by many as identical expressions. How is it with the similar expressions $\frac{1}{4}$ of $\frac{1}{8}$ and $\frac{1}{8} \div \frac{1}{4}$? The mathematical language in the expressions $\frac{1}{4}$ of 8 and $\frac{1}{4}$ of $\frac{1}{8}$ is certainly the same; as is also that of $8 \div 4$ and $\frac{1}{8} \div \frac{1}{4}$. The trouble is that of letting a *seemingly* identical answer obscure the underlying principle. The first case calls for a definite *part* of a definite quantity; the second for the *measuring* of a definite quantity by another definite quantity. This is but one of the many obscurities that baffle the child-mind.

All this would seem to indicate the need of better teaching, and probably better teaching with fewer children in the class would give far better results than are now obtainable. But the real trouble lies deeper than that and affects, not the arithmetic alone, but the reading and the writing. The great difficulty is that of forcing the *child-mind to grasp new ideas and their expression in new, unknown characters at the same time.* In arithmetic the child-mind is capable of grasping the fundamental principles and applying them with amazing precision in the problems which emerge in connection with work or play, if not confused with figures, a language for which as yet he has found no need. Similarly, before he can use with any degree of accuracy his own eyes, ears, and other senses to gain thought, his own tongue to express it, he is forced to the written or printed page to obtain — what, thought? Oh, no! but repetitious nonsense in which he has no interest except that derived from pleasing his elders by this accomplishment.

Anyone who has taught large numbers of little children of five and six years of age to read; who has watched the earnest, intent little faces; seen the struggle to understand; seen the baffled, defeated look so often creep into the bright eyes — has realized the need for care lest defeat be followed by despair. Children of even average ability can undoubtedly be taught to read with considerable fluency between the ages of five and seven. But though the best devices known in teaching today are used, it is accomplished by means of constant repetition. The devices relieve the monotony, but the process nevertheless is repetition, memory. It cannot be otherwise with such young children, and it must necessarily consume the greater part of the time allotted to school work.

So far as primary education is concerned, the chief difference between the *new education of today and that of a generation or so ago lies in the use of devices to mitigate the rigor and monotony of the work.* The idea of interest, of variety in unity, as factors in securing the child's co-operation, has modified the way of presenting facts or truths to the young mind; the need of handwork, to relieve both mind and body, has changed the routine

of work; the introduction of stories and nature study offers food for the imagination, opportunity for the training of sense-perception, of observation.

But with the vast majority of teachers these are even yet perfunctory details, adjuncts to their daily work, ofttimes grudgingly attended to because of the time they consume. Judging from the outlines of primary work usually furnished to teachers, it would seem that many supervisors attach but little value to them also. Thoughtful educators and teachers are coming slowly but surely to give to the handwork, the stories, the games, and the nature work the value rightfully due them; for they alone afford opportunity for the development of powers which make for character, fit for life. And the other work which formerly usurped all the time seems somehow to be acquired with greater ease in less time. "So the last shall be first, and the first last," is as true of the importance to be attached to the several phases of primary-school work as of judgment in the essentials which constitute character.

When that which was introduced to mitigate what was regarded as the legitimate work of the primary school usurps the place of that work and becomes *the* work; when, in other words, reading, writing, and figuring are relegated to their proper place, becoming the incidentals of primary work, then we shall, indeed, have in the primary school the *new education.*

When manual training was introduced into the high school it was feared that the purely intellectual work would suffer. It remained for experiment to prove the contrary, which it did. Educators have always feared lest the age when memory is easily retentive be passed before children acquire a mastery of those necessary tools, the "three R's," which open the gateway into real knowledge, so they have erred in burdening the child with them before he was ready to receive or use them. This, too, at a time which might better have been spent in introducing to him, through stories told, the great thoughts and ideals which folk and fairy lore, literature, and history hold for him, when, in connection with handwork, problems in measuring, weighing, computing, which would be real tests of mental power,

should be solved; when habits of observation, inference, generalization, self-direction, self-reliance—in short, all the aptitudes which make the future student possible—should be forming. The *new education*, when it is fully come, will bear in mind the necessity of mastering the written characters of knowledge, but will *first provide thoughts to express, then the means of expressing them.*

When the great principle of the kindergarten, "development through self-activity," has become the watchword of the primary school likewise, the children in passing from one to the other will not experience that strange change in atmosphere and work which leads the more active of them to use their aroused but unemployed powers in the invention of mischief, and which leaves the duller of them, whose glimmer of light has been snuffed out, to grope in denser darkness. The teacher of the primary class will no longer wonder what she is to do with those active, restless little kindergarten children, for she will be able to direct and employ to the full the alert powers of mind and body awaiting her guidance.

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KINDERGARTEN PLAN FOR THE SPRING QUARTER.

ANNE ELIZABETH ALLEN.

THE garden will be the focal point toward which the work in the kindergarten for the spring term will be directed. Every element directly affecting this subject will be closely observed, and the pictorial aspect of the whole subject will be worked out. From the time of the opening of the first pussy-willows every change in our environment will be watched. The first budding of the trees, return of the birds, opening of cocoons, length of day, rising and setting of sun will be noticed. We shall have constant outdoor excursions to the parks and lake in order to follow closely these changes as they appear.

Last October much of our time was spent in collecting seeds from the plants in the entire garden. These were separated, divided, and put away in envelopes made by the children. This spring we shall set aside a part of our garden space for planting these seeds as we choose, avoiding only too much crowding and finding out the best place for vines as well as plants needing no support. Besides this space, each child will have a plot of ground for himself in which he may plant the seeds he brings from home. If we may have more ground we shall plant vegetables that the summer-school children may use for their parties. The older children will be helped (not interfered with) to find the best way to plant their seeds, while the younger ones will be left mostly to their own devices.

The following is only a suggestive program which will yield to any stronger interests which may grow out of our winter work:

APRIL.

Water, its source and uses.—Where does water come from? Where do the water pipes get it? Where do the clouds get it? Where does the rain fall? Where does it all go when it falls upon the ground, sidewalks, houses, into the street gutters, etc.? (Trace water to the lake.) Where do the clouds get the water? (Experiments in evaporating and condensing water; condense steam from spout of teakettle, etc.) What becomes of the water that falls upon the ground? (Experiment with different soils.) Watch action of rain on the ground; how it makes ridges and carries off particles; how it settles in hollow places and runs down inclined places. Go to the lake and watch action of waves on the shore. Uses of water in homes — such as bathing, drinking, scrubbing, washing dishes and clothes, and sprinkling the lawn.

Work of sun and wind.—Use sunglass to show how hot the concentrated rays are. Effect of sun on plant life. Why do we have greenhouses? Visit conservatory in South Park, noting structure and temperature. Compare

temperature inside and out, and note how plants thrive in such an atmosphere, specially calling attention to the moisture there.

What do we see the wind doing when we go to the parks or along the street? Have you ever seen it carrying seeds? (Show how the wind will carry milkweed seed.) Why does it carry seeds? What else carries them? Did you ever see seeds being carried by water?

MAY AND JUNE.

These two months will be spent mostly in making our garden. Things to be considered in making our garden: ground space, its situation and protection; kind of soil; supply of water; tools needed; use of each kind; care in planting. What do plants need? (This as a review and to give the children personal experiences.)

Test with four seeds of same kind: First seed, plant in soil without water; second seed, plant in wet soil and keep in the dark; to third seed, give water and no soil; to fourth seed, give water, soil, and light. Note effect of treatment on each and decide upon best conditions for our garden.

We shall spend at least an hour a day out-of-doors and devote what time is needed to the care of the garden, bringing in the weeds as they appear, so that the children may become acquainted with them and know what plants to discard.

Materials used.— Large blocks for roofs, gutters, sidewalks; second-gift beads, garden hose, and springling carts; clay for modeling hose, bath-tub, sprinkling hose, dishpan, laundry tubs, and soap; also for making birds' nests and cocoons; soft tin for garden tools; sunglass and prism; triangular, circular, and square tablets to represent flower beds.

Number processes.— Measuring garden beds; spacing for planting of seeds; dividing up the seeds among each other; best forms for flower beds experimented with, having in mind the economy of space.

Games.— Impersonation of growing plants; cocoons and moths; hen and chickens; mother bird with little birds; clouds and rain; dandelions.

Songs.— Eleanor Smith, "To the Great Brown House;" "In the Snowing and the Blowing;" "In a Hedge;" "Plump Little Baby Clouds;" "The Rain Carriage;" "God Sends His Bright Spring Sun;" "Baby, What Do the Blossoms say?" Jessie Gaynor, "The Light Bird;" "The Tree's Friend;" "The Flower Bed;" "Birth of the Butterfly."

Stories.— Celia Thaxter, "Peggy's Garden and What Grew Therein;" A. E. Allen, "Three Neighbors;" F. J. Cooke, "The Swan Maidens," "The Palace of Alkimös;" Scudder, "The Story of Chicken-Licken;" M. M. Dodge, "How Double-darling's Shoes Became Ladies' Slippers;" K. D. Wiggin, "Aqua, or the Water Baby;" F. Stockton, "Old Pipes and the Dryad."

GRADE OUTLINES.

FIRST GRADE.

BERTHA PAYNE.

History.—The doll-houses, began in October, will have been put together, painted, and papered, and the process of furnishing will have been begun by the 1st of April. During the spring quarter the children will finish the furniture and glaze the windows, using mica in the place of window glass. The dining-rooms and kitchens will be supplied with dishes, which the children will make and which will be burned in the kiln. In connection with the pottery, stories will be told of the invention of pottery. The children will be taken to the museum to see the coiled pottery of the Hopi Indians and the decorations on primitive dishes. Tin utensils will be made for the kitchen from the lightest weight tin. When the houses are finished sufficiently for use in play, a village will be arranged with them, and, as this will suggest the need of shops, some of the houses may be converted into stores, a post-office may be arranged, and the children may invite the kindergarten children to join them in plays of housekeeping and storekeeping. The children of the third grade have arranged their garden plot to represent a farm with a log-house upon it. This gives opportunity for interchange between village and farm, by transportation of crops from one to the other when houses are taken out into the garden.

Geography and nature study.—1. Trips to swamp and woods will give the children material with which to stock an aquarium and a wood garden. Comparison of soil of each with that of the school garden and adjoining field. Fitness of environment to characteristic plant life in each case.

2. Planning garden: apportionment of plots to individual children. Testing soil by starting seeds, some in pots filled with earth from garden, others in earth with fertilizers added, others in clay, and others in sand. Pots kept under same light and same heat, and given same quantity of water.

3. Seeds saved last October examined and choices made for planting, first, on basis of child's unguided preference; secondly, on possible uses of crops during fall and winter; thirdly, on basis of summer use by kindergarten and primary classes in summer school.

4. Preparation of ground: planting seeds, bulbs, and tubers. Weeding and watering. Observation of effect of rain, and use of hose on newly planted seeds and on seedlings. Observation of effects of washing under drip of eaves of schoolhouse roof where perennials and bulbs were planted last year.

5. Birds: time of return, nesting, songs, notes, coloration, and habits. Food of birds. Robins watched in park. Children may try to count the number of grubs taken from sod by a robin in a given twenty minutes. Relation of birds to insect life. Relation of insect to plant life as seen in garden. Relation of birds to crops.

6. Observation of insects found in garden — appearance, habits, food. Cage made as described in ELEMENTARY SCHOOL TEACHER, Vol. II, p. 659. Use of earthworms. Cage made for earthworms of two pieces of glass, each 18 x 22 inches, fitted into grooves in two pieces of wood each 1½ x 22 inches. Pieces of wood placed opposite each other and cage set in a pan of water, one open end in pan, the other facing upward. Cage filled with earth and earthworms. (See Hodge, *Nature and Life*, p. 427.)

7. Observation of water insects, fish, crawfish, and turtle. Questions to be answered by the children: "What do they eat?" "How do they eat?" and "How do they move?" Development of frog's eggs watched.

NOTE.— In nearly all of this work with living creatures there will be very few formal lessons. The children will be given something to do for or with plants and animals. Some questions will be asked and plenty of time given for the answer. Frequent opportunities will be given for graphic representation, in painting and drawing, and occasionally some written expression will be asked for.

8. Trees: a few typical trees, selected last fall, will be watched and sketched from time of first opening of buds until close of school. Several twigs upon each tree will be marked at opening of terminal buds; one child may measure and record growth of each tree, and may sketch its leaves and blossoms, and its whole appearance, from time to time.

Literature.— Story of "Palissey the Potter;" "The Porcelain Stove," from *The Story Hour*, by K. D. Wiggin; "Rhoecus," by Lowell; "Old Pipes and the Dryad," by Frank R. Stockton; "Birds of Killingworth," by Longfellow; "King Solomon and the Bees," selections from *Just So Stories*, by Kipling.

Reading.— Incidental reading of explanatory words, or lists needed in work. Dictations in manual training and construction. Records in experiments. Recipes in cooking. Short stories taken from "Bird Stories" in the *C. C. N. S. Envelope* and *Literature Series* by Flora J. Cooke. (See COURSE OF STUDY, Vol. I.)

Painting and drawing.—Weekly sketches of landscape. Twigs at various stages of growth. Seedlings from first appearance of change until plants blossom. Flowers of woods and garden in two series, made into a booklet. Cover designs for these books made by conventionalizing any flower chosen. Designs carried out, whether in water color or paper cutting, and made to illustrate some principle of design, such as an all-over pattern of repeated units, or border pattern of alternated and repeated units, with centerpiece.

Number.—Addition, subtraction, multiplication, and division necessary in buying.

Plotting space twenty feet square to give each of sixteen children an equal share. Keeping account of money expended for cocoa, milk, and desk supplies from allowance of 25 cents per week. Measurement of rooms of toy-house for accommodation of furniture. Measurements needed in making furniture of wood from rough stock. Measurements for toy-wagon reduced from real wagon, feet reduced to half-inches.

Recipes for cooking enlarged from quantities sufficient for one person to that needed for two, for four, or for sixteen. This brings into use relation of gills, pints, and quarts, ounces and pounds.

Cooking.—Food prepared over gas stoves and baked in oven built out-of-doors last November. Baking of potatoes, eggs, and apples. Making custard and cornstarch pudding. Preparation of lemonade and whipped cream. Starch made from potato, and used in starching doll clothes.

Clay-modeling.— Dishes for use in doll's house and larger dishes for use in outdoor luncheons.

THIRD GRADE.

GUDRUN THORNE-THOMSEN.

WITH the first signs of spring, when things are happening out-of-doors, the children demand a life away from the schoolroom; they demand work very different from that of the winter months. Ideally, the school should then be only a convenient place in which to discuss the experiences of the outdoor life. As far as possible, the children will go on excursions every week during May and June, to the farm, woods, swamp, and prairies in the neighborhood. The school garden will afford an excellent opportunity for a great deal of healthful work. The school garden is 160 feet long and 40 feet wide. Each grade will have alloted to it a piece of ground with full responsibility for its planting, sowing, weeding, and harvesting. Although the actual work in the garden will not begin until May, the children must make their plans beforehand and find out what they need to know in order to conduct the work successfully.

A log-house, sheds, and stables made of wood, and the farm animals made of clay, have been finished during the winter quarter. The third grade will have 724 square feet of the school garden at its disposal, and this ground will be turned into a miniature farm. The plan, measurements of the fields to a scale, fences, roads, etc., will be made by the children to suit their fancies. Flowers will be planted around the farmhouse; the kitchen garden will, of course, be found in the rear. Wheat, corn, oats, and timothy will probably be sown in the fields; potatoes, turnips, peas, beans, and lettuce in the kitchen garden; while salvia, cornflowers, phlox, and sweet alyssum will blossom in the farm garden.

Before the actual farm work begins, the children will make drawings to show the general plan of the farm, with its fields and gardens. When they have decided which flowers and grains to plant, they must find out about the

habits and demands of those plants, the condition of the soil, how to prepare it for the proper growth of the seed or plant, how deep to plant, etc.

The means of getting this knowledge will be: (1) to write for information to the children at Kansas, Ill., who live on farms where wheat, corn, potatoes, and other plants are grown; (2) to visit a farm while planting is in process; (3) to read.

When germination takes place out-of-doors, the children will make a careful study of the plant and animal life on a prairie area selected for the purpose. Each child will make a calendar on a large piece of white bristol board, to keep a record of what goes on in his plot. He will also note in his record the appearance of trees, the returning birds, insect life—in short, any sign of the reawakening of spring. The daily weather observations, particularly of the temperature and rainfall, will now be used to build up the picture of cause and effect, the increase of heat explaining the changes taking place. For suggestions on work in germination and the preparation of boxes in which to plant the seeds, see Jackman's *Nature Study*, pp. 312–15.

Several experiments may be performed to show how water is absorbed by a plant. For instance:

1. Allow a small plant to grow in a bottle of colored water. (The water may be colored with eosin.) In a short time the red color will be spread all over the stem and leaves of the plant.

2. How much moisture does a plant use in a certain length of time? Let a sturdy plant grow in a bottle filled with good soil, moistened. Cork the bottle tightly, allowing the plant to come through a small hole in the cork. The space around the stem must be sealed up. Weigh the whole thing. After a number of days, weigh again.

In order to understand the value of soils in relation to plant life, it will be necessary to perform experiments which will show some of the physical properties of soils. The following directions are taken from Jackman's *Nature Study*, p. 436:

"1. To find the rate at which soils allow water to pass through them, take several glass tubes, about half an inch in diameter and a foot long, and tie over one end a piece of linen. Fill each one with a different specimen of soil which has been finely powdered and well dried. Set the tubes upright in a vessel having about an inch of water in it, and note the rate at which the water rises in the different tubes. Keep the water at a constant level in the pan by occasional additions.

"2. To illustrate the different capacities for water: Fold two filters and place them loosely, one inside the other, in a funnel. Carefully dry and place on a filter an ounce of finely powdered soil. Add to this cold water by drops until it begins to trickle down the funnel tube. Continue to add until sure that the soil is perfectly saturated, and then remove the filters to a piece of blotting paper or a cloth which will absorb the moisture from them. Then place the under filter in one scale pan, and the other one, with the soil

upon it, upon the other, and balance with weights. How much heavier is it now than the dry soil? What part of it is water?"

As soon as the first spring flowers appear, an excursion will be taken to the woods. Points for study: (1) Location of first flowers found. (2) Do they grow singly or in mass? (3) What makes them appear so early?

A sugar maple will have been selected previous to the excursion, and one tapping will have taken place in March. On the excursion the tree will be tapped again. The flowing of the sap will help the children to realize the work of the tree at this time. Boiling the sap to syrup and sugar will follow this observation.

Study of returning birds: Continual visits to the parks; birds observed on excursions; the interrelation of bird, insect, and plant life; the structure of birds — bill, feet, wings, shape of body — as adapted to particular functions. (Specimens in museum used.) Painting, drawing, and modeling are the chief aids to observation in this study. The children will have an opportunity to verify their observations and to find out what they have no means to observe by using the books in the library bearing on the above subjects.

Gardening. — The gardening will take the place of the regular cooking lessons, which will be discontinued during the spring quarter. With the exception of the plowing, which the children will watch, all the rest of the gardening will be done by them. Raking, sowing, and planting, watering when necessary, weeding, freeing the plants from injurious animal life, comprise this work.

History.— The children have completed the farm buildings and stocked the farm. When the products are raised, a market must be found. The first grade will by this time have finished its houses, which will be made into a village and placed at some distance from the farm. The farmers fill their wagons (made in the manual training) with their farm products, radishes and lettuce, and drive to a station, where these products are loaded on a train (made by the fourth-grade children), which runs to the village. The beginning of a town will be the subject of study; where situated, stores, grain elevators, railroads, etc. Means of study: visits to South Water street to see truck farmers' products, the commission-house men buying, etc.; maps of the United States for the location of town and cities. Why is Chicago where it is?

Mathematics.— The garden work demands a great deal of work in measuring distances, and ideas of area, dry measure, and values. The history work necessitates a close study of interchange of commodities. It will be necessary to ascertain the prices of farm products, cost of transportation, market value, value of labor, etc.

Literature.— Spring poems to be committed to memory. A spring festival will be held, the third grade taking part in the dramatization of the story

of the "Sleeping Beauty." The story will be told to the children, they working it into a play.

FOURTH GRADE.

ROSE PHILLIPS.

History.—The work of the winter quarter has been the history of the making of the city of Chicago. In tracing the growth of the city, it was necessary to emphasize its location in relation to the surrounding country. The development of transportation and means of communication has formed an important feature of the work.

In the spring we shall consider some of the modes of public service—those functions of government by which the comfort of the people in a great city is secured. Among these are supplying water, making and illuminating streets, and building bridges.

1. Water supply: Source; means by which it is brought into our houses; relation to health of people; primitive methods of obtaining water; story of the construction of the first crib and tunnel; visit pumping station and crib.

REFERENCES: Kirkland, *History of Chicago;* Andreas, *History of Chicago;* Cleaver, *Reminiscences of Early Chicago*, p. 47; *Journal of Western Society of Engineers*, February, 1901; *Water System of Chicago* (published by J. M. Wing & Co., 1874); Mason, *Water Supply;* Hasen, *The Filtration of Public Water Supplies.*

2. Streets: Plan of city; width of streets; kinds of paving; history of street-paving; street-cleaning; stories of noted roads, as those of the Romans; visit Field Columbian Museum.

REFERENCES: Andreas, *History of Chicago*, p. 56; Bross, *History of Chicago*, pp. 48, 118, 119; Cleaver, *Reminiscences of Early Chicago*, p. 29 ("Fergus Papers"); *Shop Talk of the Wonders of the Crafts*, Second Series, pp. 176, 203, 229; Currier, *Practical Hygiene*, p. 155; Waring, "Street Cleaning in New York and Abroad," *Municipal Affairs*, Supplement, June, 1899; Campbell, "Road Contsruction and System of Control," *Sanitarium*, April, 1901; Shaw, "George Edward Waring," *Review of Reviews*, Vol. XVIII.

3. Illumination: Present methods; advantages of each and cost of each; history of methods of lighting; the lamplighter.

REFERENCES: Knight, *American Mechanical Dictionary; Municipal Engineering;* Earle, *Home Life in Colonial Days*, p. 32; *The Evolution of Artificial Light* (published by the Union Pacific Railroad, 1893—Chicago Public Library); *Municipal Affairs.*

4. Bridges: Present appearance; artistic and inartistic examples; history of the old ferries and of the methods of bridge construction; difficulty of reconciling the commerce of the river with the traffic of the city.

REFERENCES: Andreas, *History of Chicago;* Kirkland, *History of Chicago*, p. 24; Heck, *Iconographic Encyclopædia*, "Bridges;" Knight, *Mechanical Dictionary*, "Bridges;" *Universal Cyclopædia*, "Bridges;" Moffett, "The Bridge Builder" (careers

of Donger and Doring), *St. Nicholas*, Vol. XXVIII, p. 588; Woodbridge, "Bridges, Artistic and Inartistic," *Brush and Pencil*, September, 1901; Barnard, "The Brooklyn Bridge," *St. Nicholas*, Vol X, p. 689; Stockton, "Personally Conducted," *ibid.*, Vol. XII, p. 20; Walden, "The Story of an Old Bridge," *ibid.*, Vol. XV, p. 277; Hameson, "The Evolution of the Modern Railway Bridge," *Popular Science Monthly*, Vol. XXXVI (1890), p. 461.

Nature study.—Plants: Before plants begin their growing, temperature of soil and air will be taken daily to ascertain the warmth necessary for budding and germinating. Other conditions conducive or inimical to early growth will be noted, as (*a*) location, sunny or shaded, sheltered or exposed; (*b*) soil, loose or compact, quality; (*c*) ground, grassy or bare, sloping or level.

1. Trees: (*a*) bud protection; (*b*) order of budding; (*c*) growth at end of twigs; (*d*) yearly additions to trunk.

2. Biennials and root-plants; (*a*) underground stems; (*b*) roots; (*c*) relative number; (*d*) date of appearance of growth; (*e*) depth of root; (*f*) time of flowering; (*g*) time of seeding.

3. Seedlings. (*a*) Noting order of appearance. (*b*) Determining approximately the number of seeds germinating from a given amount of (1) soil to the depth of four inches; (2) soil below four inches. (*c*) Placing plants at a disadvantage in regard to (1) light, (2) moisture, (3) soil, (4) air, (5) depth of planting, (6) distance of planting, (7) weeding, to note adaptations, and to give basis of comparison with plants under opposite conditions.

In the consideration of the school-garden, the children's experience, experiments, seed-catalogues, and books on gardening will be used as aids in solving the problems that arise as to its planting and care.

REFERENCES: Jackman, *Nature Study in Grammar Grades* and *Nature Study in Common Schools;* Coulter, *Plant Life;* Jordan, *Animal Life* and *Animal Forms;* Comstock, *Entomology;* Weed, *Entomology;* Apgar, *Trees of North America;* Kerner and Oliver, *Natural History of Plants.*

Geography.—I. Water supply of Chicago: Visit crib and pumping station; also where basements are being dug which reach ground water. Water tunnels; manner of construction. Springs, wells, rivers, as sources of water supply: (1) springs, formation, kinds of; (2) wells, common and artesian; modes of well-making.

II. Clothing, sources of materials: (1) Cotton; plant in school-garden; best conditions for growth; cotton culture in southern United States; picture life on cotton plantation. (2) Wool; visit Stock Yards for sheep and wool; picture life on sheep ranch; sheep-shearing and preparation of wool for cloth. (3) Silk; raise silkworm in schoolroom; best conditions for growth of silkworms; stories of silk culture in China and Japan. (4) Flax; pupils plant flax in garden; flax culture; preparation for linen.

REFERENCES: See Miss Baber's "Outline of Geography" for December.

Literature.—During the winter quarter two stories, *.007* and *The Ship that Found Herself*, by Kipling, have been read. *The Adoption of Mawgli*, by

the same author, has been read and dramatized. In the spring quarter, *Viking Tales*, by Jennie Hall, and *The Story of Seigfried*, by Baldwin, will be read.

French.—The work will connect with the study of flowers and birds. A French picnic at Thatcher's Park (Oak Park) is anticipated.

Arithmetic will be essential to the work in nature study, history, and geography, and in keeping account of the expenses incurred by the children. Drawing, painting, clay-modeling, and manual training will be made use of as the study of the central subjects demands.

FIFTH GRADE.

GERTRUDE VAN HOESEN.

History.—The settlement of New York.

I. Story of Henry Hudson: (1) geography of the Hudson valley; (2) read *Rip Van Winkle*, by Washington Irving.

II. Character of the Dutch: (1) geography of Holland; (2) customs of the people; (3) read *Hans Brinker*; (4) read *Little Town of Brook*, by Washington Irving.

III. Settlement of New Netherlands: (1) establishment of trading posts; (2) New Amsterdam; its position; study maps to see its importance as a gateway to the West; (3) cause for the estates of the patroons; (4) compare with the English colonies in regard to trade, schools, and political and religious freedom; (5) story of Peter Stuyvesant; (6) change from Dutch to English rule — causes and results.

Geography.—Study of geographical conditions influencing the settlement of New York. Study of Hudson river as a type of drowned river valley. Experiment in laboratory, showing methods of formation of such river valleys. (See Miss Baber's "Outline for Fifth Grade," secs. 2 and 3.)

Civics (from Miss Rice's outline, November, 1901).— Protection: (1) Fire — appliances; stories of firemen and their work; taxation necessary for the support of the fire department; history of the methods of protection from fire; relation of fires to modes of building. (2) Police — duties; cost of maintenance; public institutions under their care; contrast soldiers at Fort Dearborn; the knight of Middle Ages; the tithing man of New England. (3) Life-saving station — duties of the crew; value to Chicago. (4) Sanitation — sewerage; garbage; board of health.

Science.—Observations in connection with the awakening of spring: (1) birds; (2) insects; (3) trees; (4) plants; (5) the change in the sun's shadow; (6) the difference in temperature; (7) the changing landscape, recorded in water-color.

In connection with study of plant life the work will naturally be divided into two related parts: (1) observation, (2) experiments to explain that observation: (*a*) the water relation; (*b*) the heat relation; (*c*) the light relation. Each child or group of children will be held responsible for some part of the

work, and a report will become a necessity, as it will be an important part of the whole.

The care of the garden will form a large part of the spring science. The preparation before planting, the planting and weeding, and the individual habits of growth of the different plants, will of necessity be observed, as the active part taken by the children in caring for the plants will require such observations, while the records made will make their observations more definite.

Dramatic reading.—Rip Van Winkle, by Washington Irving; poems of heroism.

Industrial arts.—Clay-modeling, manual training, weaving, painting and drawing, and gardening.

Arithmetic.— Fractions, simple decimals and percentage, and use of the metric system.

SIXTH GRADE.

MARY REED.

History.—During the winter quarter the history study has been the stand for independence made by the American colonies. The story of the Greeks at Marathon, Thermopylæ, and Salamis shows an event of similar meaning in a very different period of history. The study of the Greek wars with the invaders makes necessary a presentation of Greek life as a whole, especially within the cities of Athens and Sparta.

1. The Persian wars: stories of Marathon, Thermopylæ, and Salamis.

2. The training of the Greek warrior; comparison of the education which Sparta and Athens gave their youth; study of Greek games through sculpture; the Olympic games, their preparation, conduct, and rewards.

3. The city of Athens as the best type of civic beauty; the Acropolis; the Parthenon, with special regard to the story of its frieze; a comparison of the early and later sculpture, to show quite simply the growth of artistic skill.

4. Our present-day use of Greek art and its evidences in the fine buildings of Chicago: a comparison of our best public buildings with those of Athens and a consideration of the proposed plan for the beautifying of Chicago.

Geography.—I. In connection with Greek history a study of Eurasia will be begun, Europe being studied in detail and with special reference to the peninsula of Greece.

1. Eurasia: size, shape, topography, drainage, and climate; comparison with North America.

2. Europe: position in relation to the continent as a whole; mountains, plains, and plateaus, and their effect upon climate and cultural development; drainage.

3. Greece: mountains and their influence upon the development of a people; climate; soil and products, and their relation to the limestone formation of the peninsula; coast-line, cities, and people.

II. The study of the region about Chicago which was begun in the autumn quarter will be continued. Field trips proposed are to the ravines at Glencoe, to the swamp at Ninety-first street, to the dunes at Dune Park, and to Stony Island. By means of these trips will be studied the action of rivers, of wind, of the lake, and of glaciers upon the topography of this region.

III. Reading of maps: interpretation of topography through color, and of distance through scales.

Literature.— Andrews, *Ten Boys;* Church, *Three Greek Children* and *Stories from Herodotus;* selections from Æschylus; *The Persians;* Hall, *Four Old Greeks;* White, *Plutarch for Boys and Girls,* Themistocles; Kaufman, *Our Young Folks Plutarch,* Themistocles, Aristides.

English.— Simple renderings of the Greek stories most enjoyed by children, and a possible dramatization of one of them; records of all observations made upon field trips and upon indoor experiments; exercise in composition and spelling based upon the needs shown by the written work.

Home economics.— In their previous cooking lessons the pupils have begun the study of doughs and batters, using air as the means of making them light. Now use will be made of carbon dioxide for lightening doughs: (1) in baking-powder mixtures, such as biscuit and shortcake, studying baking powder and its ingredients, soda and cream of tartar, and identifying the gas as carbon dioxide by the same tests used in the simple chemistry lessons of the winter quarter; (2) in making bread of yeast, in which will be found another method of producing carbon dioxide in the life-process of a microscopic plant. We shall make a study of yeast under the microscope, and a comparison will be made of the fermentation process utilized in bread-making with the fermenting of fruit observed in the lessons of the autumn quarter.

Nature study.— The work of the quarter will be done by the grade as a whole upon the field trips, in the school garden, and by means of various experiments. Special observations in various directions will be made by small committees of children, who will make regular reports to the grade in order to allow of wider range to the work.

I. Field study: (1) Study of the characteristic vegetation of the different topographic areas visited; trees, with special reference to their buds, flowers, and seeds. (2) Birds—their characteristics and habits and the connection between their return and their food supply. (3) Animal life and its relation to plant life; insects and pollenation; earthworms and their work. (4) Small area chosen in which to observe the process of plant awakening. Specimens from this area will be transplanted to the schoolroom window-boxes for closer study.

II. Experiments: Germination of seeds under various conditions of

soil, water, and light; the growth, nutrition, transpiration, and respiration of plants.

III. Weather observations, with special reference to the connection between temperature and plant chronology.

Mathematics.— The aim will be to use number in connection with history and geography in every possible way in which it will help to produce clearer images. Nature-study, cooking, and manual training will demand constant use of denominate numbers and call for skill in using both decimal and common fractions. The field work will demand number in such problems as the numerical relation between the plant life in the small selected area and that of given larger areas; using of data of skiameter and common almanac; measuring inaccessible distances; plotting measure to scale; computing the area of circles, triangles, and rectangles in planning for the school garden.

Manual training.— Making of articles for the general use of the grade, such as plant and insect-boxes; articles in hard wood for home use, for which careful mechanical drawings will be made.

French.—For reading, the story of Racine's *Iphigène*, much simplified, will be used. Certain scenes from Racine's tragedy will be dramatized as indicated in the French outline for April. Written dictation and exercise in the forms of verbs will be given as the need is manifest.

German.—The children have acquired a vocabulary which will enable them to talk and read with a fair degree of fluency upon topics relating to school and home. Reading will be emphasized somewhat, the matter including stories from Grimm's *Fairy Tales*, riddles, and German songs.

Art.— Illustrative drawings of Greek games, costumes, and scenes from some historical events, the best of these to be given to the third grade, which is studying the stories of Greece; in connection with geography, painting of landscape typical of the region studied; paintings as records of observations in nature study.

Music.—The reading and writing of music will be continued by means of such songs as Robert Schuman's "Spring Song," Eleanor Smith's "Pussy Wilow," Cæsar Cui's "Spring is Coming," and Reinecke's "O, Modest Violet."

SEVENTH GRADE.

ELSIE AMY WYGANT.

History.—The following outline by Miss Rice will be the basis of work in history during the spring quarter:

"The general subject of the year's work is the period of discovery and exploration in American history and the settlement of the West. In the first half of the year especial attention was given to mediæval conditions, to the events that led to the discovery of America, and to the development of the art of printing and of inventions connected with navigation.

"Passing rapidly over the colonial history of the Atlantic seaboard, because of the study of these colonies by earlier grades, we followed the pioneers across the Appalachian highlands into the middle West. The remainder of the year is to be devoted to the industrial development of the United States since the Revolutionary War.

"I. The children will trace the relations of the rivers to the mountain system and discover routes by which the settlers advanced into the interior: (1) Connection of Potomac and Ohio; Braddock's Road; Potomac Navigation Company; Washington's shares in company. (2) Cumberland Gap; story of Daniel Boone and the Wilderness Road. (3) The Hudson with its branch, the Mohawk; compare the Susquehanna and the Delaware.

"II. Movement of settlers: (1) Settlement of Kentucky — the "blue grass" region. (2) The Ohio Land Association; settlement of Marietta; Pittsburg as the "Gateway of the West;" flat-boats on the Ohio. (3) Connecticut Land Company; settlement of Cleveland.

"III. Life in the Northwest Territory: rapid growth of population; government land; a typical settlement.

"IV. Necessity of communication between East and West: trade with New Orleans; steamboat on the Ohio; separation of East and West in sympathy; demands for roads; history of the Cumberland Road; the Erie Canal; rage for canals; political union of East and West secured; the first railroads.

"V. Spread of cotton culture and unification of the South.

"VI. Development of the mining industry and settlement of the far West.

"VII. The factory system of labor; comparison of life of individual worker under this system with that of one under the guild system of the Middle Ages.

"REFERENCES: Sparks, *The Expansion of the American People;* Roosevelt, *The Winning of the West;* Turner, 'The Significance of the Frontier in American History,' *Fifth Yearbook of the National Herbart Society;* Wright, *Industrial Evolution of the United States;* Perkins, *Annals of the West;* Hinsdale, *The Old Northwest;* Winsor, *The Mississippi Basin;* Catherwood, *Story of Tonty* and *Heroes of the Middle West;* Irving, *Astoria;* Small and Vincent, 'The Family on the Farm,' *Introduction to the Study of Society.*"

Literature.—The literature studied in the autumn quarter was Tennyson's "Gareth and Lynette," and other selections on the subject of chivalry. During the winter the children are attempting to read Shakespeare's *Merchant of Venice*. For the spring quarter we have selected some short poems illustrating the idea of pleasure in work, as Longfellow's "Nuremberg" and "Keramos."

The children will be encouraged to bring in poems which they know of nature and spring, and some of the following will be read: Bryant, "Robert of Lincoln;" Wordsworth, "Daffodils," "To the Daisy" (second poem);

Lowell, prelude to *Vision of Sir Launfal;* description of spring from *Biglow Papers*, No. VI; Walt Whitman, "Warble for Lilac Time;" Clara Smith, "Jack in the Pulpit;" Lowell, "The Dandelion."

Geography.—The seventh grade will study North and South America as one land mass, working in detail upon the geography of the United States and trying to trace its effect upon the westward movement in the history of the country. We shall follow the work as outlined by Miss Baber in the ELEMENTARY SCHOOL TEACHER for December, 1902, and July, 1901, which for convenience is quoted below:

"North and South America.

"I. Western continent — size; shape; influence of shape upon its cultural development; topography — mountains, plains, plateaus; if American Mediterranean were land, effect upon life-development; if the high ranges of the mountains were on the eastern side of the continent, effect upon life and culture. (1) North America — simple story of the evolution of the continent. (2) South America — location; area; altitude, compare with Africa; physical features: Andes mountains, Guiana highlands, Brazilian highlands, central plain; river basins — Amazon, La Plata, Orinoco, Magdalena, Atrato, Guiana system, Patagonian system; as a system of water highways compare with other continents; climate — temperature, compare with Africa; prevailing winds; rainfall, compare distribution of rainfall with other continents; account for small desert area; native product; distribution of forests, prairies; culture products."

"North America.

"1. Climate: Movement of storms in the United States; distribution of heat; southern limit of winter isotherm of 32°.

"2. Western highlands: Extent, altitude, appearance, and formation of Rocky mountains, Sierra Madre mountains, Sierra Nevada mountains, Coast Range, Mexican Plateau, and Great Basin. Characteristics of river basin found in the western slope of the great highland mass, Colorado, Sacramento, San Joaquin, Columbia, Fraser, Yukon. What attractions for man does this western highland mass possess? What are the influences, both evil and good, of a desert or semi-desert region on the rest of the continent? For agricultural purposes, which is to be preferred, an irrigated region or a region of constant rainfall?

"3. Great central plain: Extent; elevation; winter and summer appearance; glaciated region; account for lakes; non-glaciated region. Characteristics of river basins: Mississippi, Mackenzie, Hudson Bay system. Value of the great plain in the development of the continent.

"4. Eastern highlands: Extent, appearance of (*a*) Canadian highlands; (*b*) Appalachian system; New England mountains; Blue Ridge; Appalachian valley; Alleghany plateau; Piedmont. What is the effect of the Piedmont region on the rivers which cross it?

"5. Coastal plain: Extent; appearance; formation; agricultural value.

"6. Past geographies of North America: How are the past aspects of a continent obtained? What are the evidences that North America has had different coast lines? What are the evidences that the continent has passed through many changes of climate? What proofs are there that the topography has changed?

During the winter quarter the children used sand largely for modeling, though other materials were employed somewhat. During the spring quarter the sand will be used for all quick work, but much more will be done with composite-clay and chalk-modeling. We shall make relief maps of North and South America as one land mass, and North America, South America, and the United States in separate relief maps.

Paintings will be made of typical scenes in the following regions: Brazil, Patagonia, Andes (Chili), Appalachian mountains, Rocky mountains, arid region of the southwestern United States, cotton fields of the South, plains and grain fields of the middle West.

The field work begun in the fall will be continued during the spring in connection with the above work.

Mathematics.— The children began the making of a topographical map during the fall, but were obliged to discontinue the work because of the inclemency of the weather. They chose a neighboring plot of ground, some 300 ×250 feet, upon which they had been making some observations of typical areas. In taking these measurements they learned how to use the compass, plane table, and levels, and how to pace off distances. When the data were brought to the class, the discrepancies were so great that the final map was postponed. It was evident to the children that these inaccuracies were due to lack of skill in handling the instruments, of care in note-taking, and of knowledge of how to transfer angles. The necessary drill on these points took so much time that the second taking of measurements was postponed until spring, but at the first opportunity this work will be completed.

The laying out of the garden will continue this work on surveying, and before the end of the term the children will attempt to make a topographical map of Stony Island—an area familiar through the geographical field work.

Nature study.— The effort in the nature study will be to make this miracle of spring, with more happening every day than one can hope to realize, appeal as most wonderful to the children. Field trips will be taken in early spring, when the first hepaticas are to be found; again when the fruit trees and violets are in bloom; and again when the daisies and buttercups are in blossom and the appearance of summer has really come.

During the year the temperature curve has been kept by means of daily observations, and the average for the month has been plotted on a large chart. By watching for the first signs of spring we shall find the average temperature necessary for growth. From that time temperatures of both soil and air will be kept.

Earthworms, pond life, insects, birds, trees, and wild flowers offer possibilities of interest in continued watching and study. Individual children or groups of children will work upon these topics or similar ones, choosing either the topic or the line of investigation on a given topic when such is practicable. Experience suggests that the initiative is sometimes weak in certain children, because of their ignorance of the possibilities of the subject; therefore suggestions and outlines of work will be given; but, if some clearly defined interest and a power to originate a plan of investigation are shown, such independent work will be encouraged. Each topic will be worked out, the needed apparatus described, and a reading list given. Because of the limits of space in this article one topic only will be worked out and references given for the others.

The children who choose the pond life will need an aquarium and a dredge;[1] those who choose insects, a cigar box filled with earth and covered with glass, or a lamp chimney with bulging sides put into a flower pot and the top fitted with netting, an insect net, and a cyanide bottle; the bird committee, the stuffed birds from the museum and a pair of opera glasses; wild flower committee, tin pans for planting any specimens which they choose to bring home; and all committees a pocket magnifying glass. Weekly reports of the work will be made to the class by means of written notes and painted, drawn, or modeled records.

Suggestions for study: Earthworms: (1) When do earthworms first appear? (2) What have they been doing during the previous winter? (3) To what depths do earthworms burrow? (4) Are the burrows straight, or do they wind about? Why? (5) What is the effect of the burrows on the soil? (6) Do the earthworms work better by day or by night? (7) What do they feed upon? (8) How do they get this food? (9) Can you find any eggs of the earthworm?

Apparatus necessary: a pair of scales, some plaster of Paris, a pocket microscope, and an earthworm cage made as follows: inclose a section of soil 22 inches high, 18 inches wide, and 1 inch thick, in a frame; the frame is made of two pieces of glass, 18 × 22 inches, set into grooves on two pieces of wood, 22 inches by 1½ inches; cover the top with wire netting and place the whole in a pan partly filled with water; keep a black cloth over the case except during times of observation.

Ways of carrying out the suggestions: (3, 4) Probe into a burrow with a long wire and carefully move the soil away from one side as you work. The shape of the burrow may be preserved by pouring in plaster of Paris. A good specimen for a permanent collection may be made by cutting out the section of soil which shows the burrow after the plaster has been poured into it, pouring into the soil a dilute glue to make it hard, and putting the whole into a case made of glass, with the sides pasted together with glued

[1] A very simple dredge is made by cutting out the bottom of a tin dipper and soldering a piece of wire netting in its place.

paper. (5) Count casting on a square foot of soil. Remove and weigh. The following morning repeat the experiment. Estimate on an acre of ground. (6) Repeat the above experiment, weighing every night and morning for several days. (7, 8) Place a given weight of leaves or grass at the top of the case and observe what follows. (9) The earthworm eggs are very minute, but they roll them into a ball about the size of a mustard seed, and these may be found about the opening of the burrows, along in June.

Books which will be helpful: Jackman, *Nature Study*, pp. 303–5; Hodge, *Nature Study and Life*, pp. 424–8; Darwin, *Vegetable Mould and Earthworms*; Bayliss, *In Brook and Bayou.*

REFERENCES: Pond life: Jackman, *Nature Study*, pp. 267, 308, 352; Hodge, *Nature Study and Life*, pp. 277, 297, 411, 431, 432. Making an aquarium and managing it: *Nature Study and Life*, p. 393. Insects: Hodge, *Nature Study and Life*, pp. 45–61, 181–227, 228–72 (this includes references on mounting and preserving insects in three different ways); Comstock, *A Manual for the Study of Insects;* Belle Cragin, *Our Insect Friends and Foes;* Weed, *Life Histories of American Insects;* Jackman, *Nature Study;* McCook, *Tenants of an Old Farm;* Brightwen, *Tenants of My House and Garden;* Beard, *Curious Homes and their Tenants;* Badenoch, *Romance of the Insect World* and *True Tales of the Insects;* Comstock, *Insect Life;* Lubbock, *Ants, Bees and Wasps;* Packard, *Text-Book of Entomology*, *Entomology for Beginners*, *Guide in Study of Insects;* Evan Bruyssel, *Population of an old Pear Tree.* Birds: Chapman, *Handbook of Birds of Eastern North America*, *Bird Life;* Blanchan, *How to Attract the Birds*, *Bird Neighbors;* Olive Thorne Miller, *Bird Ways*, *Upon the Treetops;* J. J. Abbott, *Birdland Echoes*, *Birds about Us;* John Burroughs, *Wake Robin;* Grant, *Our Common Birds, and How to Know Them;* Wright, *Bird Craft*, *Citizen Bird;* Gentry, *Nests and Birds of United States.* Trees: F. S. Mathews, *Familiar Trees and How to Know Them;* Apgar, *Trees of Northern United States;* Sir John Lubbock, *Flowers*, *Fruit and Leaves;* Oliver & Kerner, *Natural History of Plants;* Britton & Beacon, *Flora of Northern States and Canada.* Wild flowers: Grant Allen, *The Story of the Plants;* Gray, *School and Field Botany;* Dana, *Wild Flowers and How to Know Them*, *Plants and Their Children;* F. Schuyler Matthews, *Familiar Flowers of Field and Garden;* Darwin, *Elements of Botany;* Macdougal, *Nature and Work of Plants;* Baily, *Talks Afield.*

The committees will work together on the questions of germination and fertilization in connection with the garden. The first consideration will be the needs of germinating seeds found by experiments with varying degrees of heat, light, air, and water. The pushing force of germinating seeds will be measured by the following experiment: In the bottom of a deep tube place a given amount of seeds, as one half pint. Pour water on these, and put into the tube a piston rod resting on the seeds. On the rod place a weight of, say, fifty pounds. As the seeds germinate they will raise the piston and weight.

As soon as the trees begin to bloom we shall make paintings of the blossoms, noting those that are diœcious. The larger blossoms of the fruit trees will aid the work. In other flowers, the lily is a good specimen for

study, because of its very large organs. Note the position of pistil and stamen in the same flower, and in flower clusters; the drooping position of some flowers and the upright position of others.

Home economics.—During the fall quarter it was impossible to carry out the work planned in the study of foods, and in its place an optional class in cooking was formed after school hours. Based upon this experience of the class, six weeks of the winter quarter were devoted to work upon the food principles.

For the coming term work in physiology is planned from the following standpoint: Food is the basis of all animal life. How does the body obtain and use it? Comparison of the ways in which various animal structures are adapted to meet this need. This subject was chosen with the consciousness that it is utterly impossible to teach physiology in three months, and that at this time in child life a knowledge of the structure of the body and an appreciation of the wonder of its mechanism are helpful in creating respect and care for it.

This particular outline of the work was adopted because it seemed to offer a logical sequence in the thinking, and at the same time to give a single problem with which the children were capable of grappling, namely, animals' means of getting and use of food:

1. Obtaining food — senses and muscles. Comparison of the prehensile organs of animals — fish, quadruped, birds, man. The adaptation of a given structure to its environment, especially adaptation of birds. Stuffed specimens in the museum used in tracing this adaptation.

2. Crushing, tearing, or grinding food — teeth. Comparison of the teeth of various animals and their adaptation to the characteristic food of the animal. Examine skulls of cow, sheep, horse, dog, squirrel, and man which are found in the museum.

3. Making food soluble — mouth and digestive organs.

4. Distribution of dissolved food — blood-vessels.

5. Purifying blood — lungs and respiration.

This brings us to a point which we had reached from another standpoint during the winter. The study of air led to finding the lung capacity of each child, the composition of pure air and air exhaled from the lungs, and that carbon dioxide was the product of combustion. The study of the circulation therefore brings us to the same point and emphasizes the interdependence of functions.

EIGHTH GRADE.

KATHARINE M. STILWELL.

History.— As indicated in the previous outlines, the general plan of history work for the year consists of the development of the idea of government. The history of Rome was selected (1) to emphasize civic responsi-

bility, and (2) to show how the Romans solved problems of government similar to the problems which are now awaiting solution by our nation.

At all points of possible contact, comparisons have been made with the government of our country, our local government, and our treatment of colonies. As the functions of the local government have been taught in the preceding grades, the emphasis of attention has here been placed on the structure.

The work in manual training in the autumn quarter, which consisted of making furniture (screens, magazine cabinet, tables, couch, chairs, stools, tabourettes, shirt-waist box, bookcase, etc.), led to a consideration of the Roman house and its furniture. In this subject the interest was enhanced by a stereopticon lecture on the dwelling-houses of the Romans, given to the class by Professor Laing, of the Latin Department of the University, and also by a visit the class made to the Field Columbian Museum. The comparison between our modern house and the Roman house has led to a study of some scientific discoveries and inventions in their relation to the modern house. This study has centralized upon electricity, and other methods of heating and lighting, and the various systems of ventilation and plumbing in use in our homes.

In March (see ELEMENTARY SCHOOL TEACHER, February, 1903) the class will compare Rome's government of her provinces with our policy in Hawaii, Cuba, and the Philippines. Some study will be made of these islands, including their history, how they came into our possession, their value to us (their natural resources), and our national responsibility toward them. The necessity for close communication between them and the United States will lead directly into the subject of cables, especially the Pacific cables. The previous study of electricity will add to the interest of this topic, which will consist of a general survey of the cable lines of the world, including the history of the first submarine cable, the first Atlantic cable, the making of a cable, the method of taking soundings, the relation of temperature and the soil of the ocean bed to the cable, the laying of cables, mending them, etc. Information on this subject will be obtained from maps in the *National Geographic Magazine*, Vol. VII, and through articles and pictures in the *Commercial Advertiser* (cable edition, January 3, 1903), a daily paper published at Honolulu, Hawaiian Islands.

The pupils will discuss the effect of the long series of wars upon the social and economic life of the Romans, and, so far as possible, will imagine themselves in Rome, and, making the conditions their own, suggest measures for relief. The similarity between the agrarian troubles and our labor troubles will be brought out in the discussion. They will read the story of the Gracchi and their mother, Cornelia, and, after learning all they can about Marius and Sulla, will compare the efforts these men made at reform with the plans they themselves have already suggested. The biography of Cicero will follow as the typical life of a Roman. His idea of government

will be discussed, and the pupils will try to fit it to existing conditions, thus discovering for themselves the cause of his failure.

They will read of Cæsar, comparing his work as a public officer, a general, a writer, and a dictator. They will then read Shakespeare's *Julius Cæsar* and compare the Cæsar of history with the Cæsar of the play. By the use of clay-modeling, the pupils will express some of their ideas of Roman life. They will model groups of statuary illustrative of characteristic scenes, and tiles in low relief, together with simple objects found in the Roman home.

Latin.—The work in Latin will continue, the class reading simple stories of Roman life.

German (Herr Prokosch).—The reading-matter of the last quarter will be selected mainly from two points of view: (1) to give the children some first-hand knowledge of German history; (2) to make them, in an adequate degree, familiar with the names and principal works of the greatest German authors. Selections from German history, poems by Goethe, Schiller, Uhland, Rückert, *et al.*, will be read and partly memorized.

Nature study.—Gardening will form part of the work in nature study. The bed laid out by the eighth grade last year will be planted, and the vegetables grown will be used by the pupils for their luncheons. In making a study of the manner in which the various plants establish their necessary relations to light, heat, soil, air, and moisture, the pupils will consider the structure of the parts of the plant as determined by their function, and how the structure is modified by the environment of the plant. They will observe the plants in the school garden, at Washington Park, on the prairie, in the marsh (Sixty-first street and Greenwood avenue), and in the pond (Seventy-fifth street and Wentworth avenue). When questions arise which can best be answered by an experiment, the pupils will be encouraged to devise an adequate experiment. Besides the plants, the trees will form a center of study for the remainder of the year. Already the pupils have begun to form a picture of the present life of the tree, and they will compare the forms of various trees and their mode of growth, which involves the position, arrangement, and angles of buds and branches. In a study of the trunk as a center of growth, they will consider its external form in relation to the forces that act upon it, and after determining the function of the various parts of the internal structure, they will try to read the life-history of the tree as indicated by the growth of these parts. The drawings and paintings which will form a part of this record will show the forms of trees, the growth of twigs, and the appearance of cross, radial, and tangential sections of wood.

Early in March the pupils will begin to watch for birds and to make a natural-history calendar, containing the date, description, name, food, habits, etc., of the various birds as they appear. These birds, and the birds that have been with us through the winter, will be studied in relation to their food

supply. The class will consider the simultaneous appearance of the earthworm and the robin, the stage of growth of the larvæ at the time of the warblers' arrival, and the effect of this timely arrival upon the trees. The special modifications of bills, feet, wings, or tail, and the relation of this to the bird's manner of securing its food, will be illustrated by drawings or paintings.

Some attention will be paid to the earthworm, the pupils noting when and where it works and the results of its work. By observations, the children will acquaint themselves with the habits of the animal, its food, movements, habitual position of body, shape and appearance of burrows, depth of burrows, and the forces of earth and air it must meet in its environment. They will also make a close study of the worm through the microscope, noting the shape of the body, the muscles, spines, respiratory surface, eyes, skeleton, etc. From this they will determine the relation of function to form. They will read the results of Darwin's observations on this subject and discuss the effect of the earthworm upon the soil. The class will make paintings or drawings of the earthworm, and mold to show bulk of castings on a given area.

Insect life found in the garden and in the park will be observed. A record will be kept of the time and place of appearance, the food, the injuries made by the insect to trees and garden plants, the place of depositing eggs, and the relation of this to the food supply, the means of defense (color relation), and the homes of insects. Each pupil will be supplied with a lens for use in the field, and compound microscopes will be used in the classroom.

Records of the observations in nature-study will be kept in writing or in painting, and an attempt will be made to have a complete story told. Because the best results in this subject come from continued observations growing out of the spontaneity of the pupils, set lessons on the subject will not be assigned, but the work will be carried on in committees, each pupil, so far as possible, being allowed to choose his particular line of investigation. In order to keep every child in touch with the whole work, the committees will report at regular intervals. Jackman's *Nature Study in the Grammar Grades* will be used as a manual.

An inquiry into the causes of the phenomena will establish the unity of the various phases of the observational work. This will necessitate a more or less systematic study of seasonal changes as dependent on the annual motion of the sun. Enough of such study will be given to make the unity and bearing of the work clear to the pupils.

Mathematics.—The mathematical work will comprise the algebra which grows easily out of the arithmetic, and will be of the nature of a review and emphasizing of the fundamental principles of the arithmetic. Graphical representation of data will receive attention. It is believed that this work will

lay a broad and sound foundation for the work of the secondary school, while it will fix the arithmetical processes upon the mind of the pupil and render their application flexible. The algebra will be closely correlated with such concrete or experimental geometry as will reinforce the algebra by clarifying and sharpening algebraic concepts.

BOOK REVIEWS.

A Text-Book of Applied English Grammar. By EDWIN HERBERT LEWIS, PH.D., Professor of English in the Lewis Institute, Chicago. New York: The Macmillan Co., 1902. Pp. xvi + 363.

IT may be doubted whether the dry bones of English grammar ever received such a beneficent shaking up as they have experienced in this book. English speech is discussed in a vital and attractive way, and new terms are often suggested as more helpful than those to which tradition has accustomed us. "The writer believes that a little technical grammar, sympathetically taught, is within the normal powers and interests of grammar-school students" (p. viii). The style of the little book is easy, fresh, and interesting. A colloquial tone seems to say at every step, "Come on, boys!"

A curse that has rested upon the teaching of English grammar in the past has been the forcing of the conceptions of Latin grammar upon the facts of present English usage. In reading the present book, the reviewer has rejoiced "to see the curse removed."

The teaching of grammar is connected at every point with composition, and especially with punctuation. As here presented, punctuation and grammar throw light upon each other.

The following specimen passages will appeal to those who have suffered many things of many grammarians:

"The verb makes the speaker responsible. If we say *the boy*, we utter merely a name. But the minute we add a verb to the name, as in *The boy lies*, we are held responsible for a statement" (p. 169).

"No system of nomenclature is half so important as the teacher's own extemporaneous terms, springing from that play of mind which is essential in all good teaching. It is only to be remembered that a sentence is a living thing, and that all analysis is, in a way, an insult to it" (note to the teacher, p. 185).

"The colon usually precedes a list. In force it is somewhat like the sign of equality (=)" (p. 268).

"The comma is the sign of incompleteness. It is used within the sentence. It shows what words are to be taken together. It is the group-maker" (p. 269).

"A *regular* relative clause shows what person or thing is being spoken of. Do not punctuate it at all. An *extra* relative clause adds extra information about something already understood. Set it off by a comma or commas to show that it is extra" (p. 275).

"In early times English had many inflections, whereas now it has but few. Our forefathers used nine forms of the word *glad;* . . . . our later ancestors discovered that one form would serve as well as many. Savage races still delight in unncessary inflections. . . . . The chief ideas now expressed by English inflection are seven: number, person, time, comparison, ownership, the subject-relation, and the object-relation. No one word contains all these ideas" (pp. 284, 285).

On p. 321 we have the excellent rule that "a verb must not *disagree* with its sub-

ject in number and person." To this is appended the following note to the teacher: "If *agree* means to vary form, then the assertion that English verbs agree with their subjects is more than doubtful. Until there is some consensus among scientific grammarians as to what 'agreement,' 'mood,' 'tense,' and 'case' shall mean in the grammar of uninflected languages, the best we can do is to avoid these mysterious words as much as possible."

It is almost illegal to pack so much common-sense into a single sentence as is contained in the last one quoted. But alas! this same p. 321 shows us the following unexpected relic of the traditional "make-believe" grammar: "The present and past forms, as *call, called*, may for convenience be regarded as singular or plural verbs according as the subject is singular or plural. And a plural subject must have a plural verb."

The phrase *assuming adjective* is a happy substitute for *attributive adjective*. But why not also say *asserting* instead of *predicate* adjective? *Assuming* and *asserting* almost seem to have been foreordained from before the foundation of the world for this use.

By distinguishing what he calls *the pure future*, *the compliant future*, and *the determined future*, Professor Lewis sets forth clearly and helpfully the uses of *shall* and *will;* and the contracted colloquial forms receive full recognition. The treatment of mood (pp. 342–5) is masterly.

The reviewer will interpose a question or an objection at a few points. The use of *owing*, *considering*, and *judging*, illustrated on p. 221 by such sentences as "*Considering* everything, it seems best to go ahead," is left quite unexplained. Has not the word *considering* here come to be used as a preposition, and should it not be so named? Pupils should hardly be asked to compose ordinary colloquial sentences with "awful or awfully" (p. 235). The possessives *a half a mile's walk* (p. 294) and *the antecedent's number* (p. 323) seem hardly in accord with the best usage.

The first main division of the grammar, pp. 1–77, takes up the common mistakes in the use of verbs, pronouns, etc. In thus beginning Professor Lewis is true to his conviction that "elementary correctness in oral usage should be the first result aimed at in teaching grammar to children" (p. vi). It is unfair to the book, however, that the first impression of it should be given by this somewhat dry matter. Anyone who thinks that grammar is of necessity a dry subject has only to read the remainder of this spicy little manual, beginning at p. 81, to be convinced of his mistake. Success to this breezy, rational text-book!

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EDITORIAL.

MODES OF EXPRESSION AS EDUCATIONAL AGENCIES.

It has not been so long since the sugar-loaf, pear, and egg shapes were quite commonly looked upon as furnishing the ideal forms into which the ornamental shrubbery and evergreens of our dooryards were to be trimmed. Those were the merry, go-as-you-please days when all lived near to nature's heart and before the artificialities of modern congested population centers were matters of serious concern to us. The very commonness of natural forms and phenomena cheapened them, and artificial manifestations therefore possessed the relish of a pleasing diversion from nature's humdrum. Hand-made symmetry and rotundity were orthodoxy in landscape gardening, and naturalness was stigmatized as "faddism," "frillism," or "fogyism;" for in the common mind these terms have always stood, as they stand today, for an undiscriminating aversion to notions which differ from the commonality of views. In short, this was the period when the function of the landscape gardener was to prune and lop off.

But the last twenty years have witnessed both the introduction into and partial elimination from education of many pernicious and powerful artificializing influences. Apparently unmindful of the fundamental fact that the life-work of everyone whose life is worth while is a continual struggle to adjust himself to natural forces and conditions, we school-men had gone on raising artificial barriers to this adjustment until we called down upon our heads the criticism that a school is an institution which most quickly unfits a man for life. Our educational efforts were guided by sugar-loaf ideals of average attainment, and our implements were the pruning hook and knife. During this period repression and suppression were the watchwords of teaching practice, and *expression* was under the pedagogical frown. At last we awoke to a realizing sense of the fact that we had lost the individual entirely in our struggle to attain and preserve the general, and that our mass-teaching was educating only a man of straw. But thanks to the fearless persistence of a few bold students of education, whose sympathy for their kind is still warm, we are at last getting pretty well away from the conception of education as a pruning process. The wholesome philosophy of George Eliot that men are like trees—if you lop off their finest branches, into which they are pouring their young life-juice, the wound will be healed over with some old excrescence; and what might have been a grand tree expanding into liberal shade is but a whimsical, misshapen trunk—is powerfully penetrating the educational thought of our time. Under the pruning-process con-

ception of education we had only too many opportunities to learn how completely out of joint the whole world seems to him whose individual desires and cravings are continually thwarted or suppressed.

But the necessary accompaniment of repression in teaching is verbal reproduction on the learner's part of the thoughts of another. The latter is, in fact, but the reverse aspect of the former. Even the primitive teacher must test from time to time the results of his teachings upon his pupil; the pupil dares not be natural, lest he subject himself to the inevitable knife, and as a consequence he must respond in the words of another. The pupil then retired into himself, and external agencies were needed to "draw him out." In due course we learned that external stimuli administered by the teacher defeated their own purpose; that the young pupil could no more be made to put forth his educational antennæ by nagging him than a snail can be made to put forth its horns by pricking them.

Happily for all lovers of humanity and human progress, most of these obstacles to education are passing away, and few indeed are they who would retard their passing. It is not mere empty optimism to see in the present situation the promise of the early dawning of a new day for education. The prolific brood of past pedagogical errors were nearly all begotten of the notion that education is an illumination of soul coming from a light whose source is without the individual. Learning was then regarded as a process of opening up the avenues to the soul through which this external illumination might enter. But we are now rapidly coming to the view that the source of the illumination is within and that learning consists in *opening out* ways through which the "imprisoned splendor" may escape. This conception exalts the function of expression in education and makes the individual pupil the object of paramount concern to the teacher.

But there are not wanting those who profess to see grave dangers in this elevation of the individual. Still, while there have been misfits in various stages of the educational scheme, most of them can be ascribed to the poorly articulated members of the organism. For example, a pupil who has been brought up in an elementary school which respects the pupil's individuality may find difficulty in adjusting himself to a high-school régime in which teaching the *average pupil* is the keynote. Moreover, teachers are possessed of an inordinate fear that pupils of strong individuality are failing to recognize duly their relation to the whole of which they are but a small part. The teacher's dread of priggishness and pertness is, however, nearly always theoretical and always immoderate. If he could but keep clearly before him that nine-tenths of the world's work is done by these strong personalities, and that those pupils whose deportment most delights their teacher's heart too often become the men and women who soon find their obscure niches in the dead level of mediocrity and disappear forever from the notice of any save those few friends whose paths cross the narrow circle of their activities, bounded by the circumference of mere bread-winning, he would easily exer-

cise a larger measure of tolerance without fear of lowering in the least the dignity of his office.

The test of all educational factors and systems is ever the same. It is neither knowledge nor ability to acquire knowledge, but power to use knowledge. The efficiency of a man is determined ultimately by the measure of his ability to mass and converge his experiences and inferences from them upon destined ends. The value of the man to his time depends upon the extent to which these ends serve to promote human welfare. Knowledge is the weapon, but the weapon may be worse than worthless without the power to use it. Hence the importance of expression in the training of children; for through the means of expression alone is it possible for the individual either to acquire knowledge or to test his power to use it.

The function of expression in education has always received considerable attention in elementary teaching, but attention has hitherto been given too exclusively to one sort of expression. We now find that spoken and written language are but *two* of the important agencies through which the pupil may communicate his thoughts and feelings to others. Painting, drawing, modeling, molding, cooking, manual training, dramatic art, and number work are modes of expression common to all children, while for many one or more of these commonly neglected modes often serve the immediate purposes of elementary education far more adequately than does either verbal or written language. When these diverse modes of expression find their natural places in the curriculum, they constitute an organic unity of agencies through which the surging energies of the pupil's innermost life may find vent. They furnish us also an instrumentality of education flexible enough to provide for the peculiar aptitudes of everyone. Backed by the store of thought-centent of the enriched curriculum, the elementary school is in possession of the machinery for realizing Professor Dewey's ideal of elementary education, viz., "to organize the instincts and impulses of children into working interests and tools."

The faculty of the elementary school of the School of Education does not claim either novelty or originality for these ideas *in theory;* but it does claim to be making a concerted and persistent objective study of the practical problem of finding ways and means of reducing these theories to terms of practice and to be making a united and, they feel, substantially successful attempt to practice them throughout the school. Several years of successful effort in this direction on the part of a good majority of the faculty both before and since uniting with the University of Chicago encourages the confident belief that many of the unsolved problems still outstanding will in due time yield under the more favorable conditions brought about by connection with the University.

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